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GENERAL EDITOR

SECTION D

GENERAL BIOLOGY, ETHNOLOGY, AND ANTHROPOLOGY

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THE PHILIPPINE
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VOL. XI JULY, 1916 No. 4

SEA PRODUCTS OF MINDANAO AND SULU, II: PEARLS, PEARL SHELLS, AND BUTTON SHELLS

By ALVIN SEALE
(From the Section of Fisheries, Biological Laboratory, Bureau of Science, Manila, P. I.)

THREE PLATES

PEARLS AND PEARL SHELLS

Next to the food fishes the most valuable products of the Sulu Sea are the pearls and pearl shells.

During 1914 there were exported from the Sulu Archipelago 300,794 kilograms of pearl shells, valued at 349,498 pesos,[1] and pearls with an estimated value of 1,000,000 pesos.

In Japan the cultivation of the pearl oyster receives great attention, and the growing of cultural pearls gives employment to hundreds of families. There is not a single place in the Philippine Islands where the pearl oyster is cultivated. The Government has supplied information,[2] and a law provides for the lease of pearl farms. Here is a good practical work for the schools of the Sulu region to undertake. A school pearl farm would yield a greater revenue than a school garden, and a little information on the subject would benefit the entire Archipelago.

THE PHILIPPINE PEARL OYSTER

The Philippine pearl oyster of commerce, known to the trade as the "Sooloo mother of pearl shell" (M. O. P.), is the gold-lip pearl oyster, *Margaritifera maxima* Jameson. It is found

[1] One peso Philippine currency equals 100 centavos, equals 50 cents United States currency.

[2] *This Journal, Sec. D* (1910), 5, 94.

throughout the Sulu Archipelago wherever the conditions are favorable, provided that it has not been removed by human agency.

The life history of this mollusk is as follows: The female gives off thousands of small ova, the male animal gives off microscopic spermatozoa, and fertilization is left to the chance meeting of these bodies in the water. When the egg is fertilized, it becomes round and develops small cilia, which enable it to swim about. It is doubtless carried many miles by currents and tides. The shell begins to form at the end of the second day, and after about eight days the young oyster settles and attaches itself to whatever offers. The young oysters seldom move far from the place where they first become attached, although the old shells wear away the ropelike byssus and lie free on the sea bottom. They continue to grow for perhaps from ten to twelve years, although they are sexually mature in two years and attain "legal" size, that is 14 centimeters, in about three or four years. The rapidity of their growth depends largely upon their location and the abundance of the microscopic marine animals upon which they feed.

For its proper growth the gold-lip pearl oyster requires a warm, shallow sea, from 1 to 70 fathoms in depth, strong ocean currents, and water with a specific gravity of about 1.02. The bottom must be of sand or coarse gravel made up of dead coral and broken shells. One of the most prolific bottoms examined during my inspection was composed of what the diver called "mud," which was in fact very fine, sandy ooze, consisting chiefly of dead Foraminifera. This bed was covered with a short growth of eelgrass. There are many places throughout the Sulu Archipelago where these conditions exist, and the most prolific pearl beds are found in such localities.

LOCATION OF PEARL BEDS IN MINDANAO AND SULU

Practically all of the area from Mindanao to Borneo is one great pearl bed, yet the beds are more or less localized and centered about various islands. Therefore I found it convenient for the purpose of examination and reference to divide this area into ten separate groups or pearl beds as follows (Plate I):

The Jolo pearl beds.—The Jolo beds include the following: Jolo, Marongas, Pangasinan, Hegad, Bubuan, Minis, Cabucan, Pantocounan, Bancungan, Tulayan, Capual, Bitinan, Dongdong, Pata, Patian, and Teomabal Islands and the banks, shoals, and islets in the immediate vicinity of these islands. The most prolific sections of the Jolo pearl beds are the channels between

the small islands directly north of Jolo and the Jolo channel proper. These beds have been fished constantly for over one hundred years, and they still yield a fair return of shells. At the time of my inspection there were twenty-four pearling boats operating on these beds.

The Tapul pearl beds.—The Tapul pearl beds include the following islands and the small islets and shoals adjacent to them: Tapul, Bolipongpong, Siasi, Lapac, Sirun, Sulade, and Tapaan. The channel between Lapac and Tapaan Islands, and the region directly east of Tapul, seemed to afford the best fishing on these beds. Twelve pearling boats were seen operating on the Tapul beds.

The Tawi Tawi pearl beds.—The Tawi Tawi pearl beds include the following: Tawi Tawi, Maniacolat, Bubuan, Cacataan, Sigboye, Tambagaan, Simaluc, Kuadbasang, Basbas, Tataan, Bongao, Simonor, Manuc-manca, South Ubian, Tabawan, Bintoulan, Kinapusan, Magpeos, and Tagao Islands and the numerous small islands and reefs south of Tawi Tawi.

These beds probably comprise the richest pearling grounds in the entire Archipelago. Twenty-one Moro pearling vintas were seen operating their dredges on beds near Magpeos Island. No pearling luggars were seen. A number of the above islands have large Moro populations, which are regarded with considerable fear by the pearlers. On South Ubian Island alone I counted two hundred Moro houses in the village. Many of these people are engaged in primitive pearl fishing.

The Sibutu pearl beds.—The Sibutu pearl beds include the islands, reefs, and shoals west of Sibutu Passage. These beds have not been properly prospected, and very little is definitely known about them. A few years ago some shells were discovered in the vicinity of Perdie Patches, and occasionally some pearl shells are brought into Sitanki by the Moros. In 1908 I prospected the large lagoon south of Sipanket, but without success. However, it is probable that some rich beds will eventually be located near Sibutu.

The Laparan pearl beds.—The Laparan pearl beds include the numerous small groups of islands which for the most part lie well northward in the Sulu Sea. These comprise the twenty or more islets known as the Pearl Bank Islands, also the following islands and the adjacent banks, islets, and reefs: Laparan, Doc Can, Deatobato, Cap, Sipang, Tubalubac, Dammi, Dasaan, Lahatlahat, Bambannan, Mamanuc, Billanguan, and Tagbabas. These beds still contain many pearl oysters, and they could sustain the operation of a large portion of the pearling fleet without damage.

From the deck of the revenue cutter *Gilbert* I counted six large pearl oysters on the bottom while we were anchored in 12 fathoms on the east side of Lahatlahat Island. Only three pearling boats were observed operating on the Laparan beds.

The Pangutarang pearl beds.—The Pangutarang pearl beds include the following islands and the adjacent islets, shoals, and intermediate waters: Pangutarang, North Ubian, Malicut, Basbas, Cunilan, Usada, Ticul, Panducan, Kulassein, Tubigan, and Teomabal. One of the richest pearl patches ever discovered in the Philippines was located on these beds a short distance east of Basbas Island. No pearling boats were seen on the Pangutarang beds, but several Moro dredges were in operation.

The Pilas pearl beds.—The following islands and the adjacent islets, shoals, and intermediate waters constitute the Pilas pearl beds: Pilas, Manangal, Palajangan, Mamannak, Pasigpasilan, Salkulakit, Lakits, Kaludlud, Dassalan, Sangboy, Pabunuan, Teinga, and Favorite Bank. Some years ago a Zamboanga pearler took a vast number of shells from these beds, and their recovery from this overfishing has been very slow. Three pearling boats were operating on the Pilas beds with but poor success.

The Samales pearl beds.—In the Samales beds are included all of the islands in the Samales, Tapiantana, and Bolod Groups and the intermediate waters, islets, and shoals from Salupin Island on the east to Manungut on the west. The principal islands are: Manungut, Bangalao, Simisa, Balanguingui, Mamanoc, Parol, Tonquil, Bulan, Memad, Dipolod, Tatalan, East and West Bolod, Lanahuan, Tapiantana, Bubuan, Timbungan, and Salupin. The Samales beds are very prolific and are constantly worked by the pearlers. Within the past few years some very rich patches of pearl-shell beds have been found here.

The Basilan pearl beds.—The Basilan beds include the shore line of Basilan and the adjacent islands of Malamaui, Lampinigan, Balukbaluk, Teingalaguit, Tengolan, Mataja, Odel, Teipono, Tamuk, Cancuman, Lahatlahat, Bihintinusa, Kauluan, Coco, Sibago, and Lanhil. The yield of shells from the Basilan beds was exceptionally large during July and August, 1914, and a portion of the pearling fleet has been operating on these beds with considerable success.

The Mindanao pearl beds.—The waters surrounding the great island of Mindanao have not been well prospected for pearl beds, and with the exception of the well-known pearling ground in Basilan Strait and in Pakoputin Strait, Davao Gulf, very little is known regarding the Mindanao beds. Therefore I have in-

cluded all of the beds adjacent to the coast of Mindanao in one group; later it may be convenient to subdivide it into smaller groups.

PRESENT CONDITION OF PEARL BEDS

The Jolo pearl beds have been fished more persistently and for a longer period than any of the other beds in the Philippines, and one would rather expect to find them in an exhausted condition. However, numerous young shells of various sizes were found on these beds, and the following account of actual diving operations will illustrate the condition in regard to adult shells.

On May 23, 1914, I was on board the pearler *Eng Lee,* which was operating near the center of Jolo Channel, directly in front of the town of Jolo. The diver, a Filipino mestizo, made three dives of twenty minutes each during the morning, in a depth of 17 fathoms. For the first dive twelve large, fine shells were secured; for the second dive, seven; and for the third dive, seven; a total of twenty-six shells for sixty minutes of actual work. The weight of these shells, cleaned, was 26 kilograms, an average of 1 kilogram per pair. The Tawi Tawi and Laparan beds are in good condition and could be worked at a profit by the pearlers, there being many adult shells even in water of not over 14 fathoms. Shells are especially abundant in the vicinity of Lahatlahat Island, and there are several places near South Ubian that were reported to me as rich in shells. There is a fair growth of young shells on these beds.

In the vicinity of Bongao some valuable pearls have recently been found; these beds have quantities of young shells and are in good condition.

The Tapul beds have been fished persistently during the past year, and a good yield of shells and some valuable pearls have resulted. There are still many shells on these beds, but for the most part in waters too deep for safe diving.

The Pangutarang beds, being for the most part in shallow water, have in many places been overfished, and while there are doubtless rich patches to be found, very few either adult or young shells were located.

The Pilas beds also have been overfished, and only a very few scattered shells are to be found. An entire day's work with a pearling luggar yielded but six shells; the second day's work yielded but ten shells. The Samales beds have yielded many shells and pearls during the past year and will probably continue to give fair results for years to come. Large patches of dead shells have occasionally been found on these beds. They were

probably buried and smothered in the sand during a storm and later uncovered by the currents or by a second storm.

The Basilan beds were the scene of great activity during July, 1914, a new bed, very rich in shells, having been discovered during May, 1914. However, it is a well-known fact that the Basilan shells are usually a little poorer in grade than shells from other beds, a condition probably due to the very soft bottom on which they grow. I have not yet been able to examine either the Basilan or Mindanao beds. However, I examined some valuable pearls taken from the Mindanao beds during 1914.

After dredging on the various pearls beds, recording many diving operations, and gathering information from numerous divers and owners, I have concluded that the pearl beds of the Department of Mindanao and Sulu are in no immediate danger of exhaustion. It would be advisable to rest the Pilas and possibly the Pangutarang beds for three or four years. However, I doubt if any regulation regarding the matter is necessary, because the fishing does not pay expenses, and this will prevent fishing more effectually than any law.

The shallow-water beds in some cases have not been exhausted after over one hundred years of fishing. The explanation of this lies in the fact that they are constantly supplied with young shells from the adjacent beds, "pockets," or mother shells, which have been overlooked or lie in water too deep for the divers. This I know to be the case in the Jolo beds, and no doubt it is true of the others. All of the pearl beds are surrounded by areas of deeper water, and many of the divers tell of seeing large quantities of shells in waters too deep to work. These and the overlooked pockets and scattered, adult shells are the "mother shells," and from them are given off each season millions of young pearl oysters, which are carried by the tides and currents all over the waters of the Archipelago. Many settle on the shallow beds and keep a constant supply of oysters growing toward maturity. No doubt some are carried into great depths and lost, others are smothered in the sand or thrown ashore and die on the beach, but as each female oyster produces several million eggs each year, many survive, and in this manner the shallow-water beds are supplied continuously with shells. I believe that no amount of fishing with the present system of hand pumps, whereby the diver is limited to a depth of about 25 fathoms, will ever fully exhaust these beds. Probably the greatest danger to the Philippine pearl beds lies in the introduction of motor-driven diving equipment that will enable the deep-water beds to be fished.

Rotation in working the pearl beds would be a great advantage, as in this manner they would be more thoroughly prospected and the old and wormy shells would be removed, thus giving a yield of clean, first-class shells every five or six years. But the revenues derived by the Government from this industry will not warrant the expenditure necessary to pay the patrol required to watch ten great beds and prevent poaching. I believe that it would be expedient to divide the entire area into two parts, with the north and south dividing line passing through Jolo, 121° east longitude, and then, alternately, to close one half of the entire area for six years. The dividing line could be watched from Jolo at small expense. This scheme would be to the advantage of both the Government and the pearlers, in as much as many more beds would be found, and after a period of twelve years the grade and, therefore, the price of the Philippine shells would be distinctly better.

I was unable to locate any particular place where the pearl beds had been excessively injured by natural enemies such as rays, skates, and other fishes. However, on some of the beds, notably at Jolo and Pilas, there were numerous starfishes, and these undoubtedly devour many of the young oysters.

CULTURAL PEARLS AND PEARL FARMING

The Japanese are the only people who have made a commercial success of growing cultural pearls. The method is to insert some foreign body into the shell of the living oyster; this body is covered by layers of pearly nacre, and thus forms the cultural pearl. However, the method of growing quantities of round pearls of as good a luster and shape as those found in nature was perfected only during the past two years by Professor Fujita, of the Imperial University at Tokyo. I submitted some of these pearls to jewelers in Manila, and they were unable to distinguish them from natural pearls.

DESCRIPTION OF THE INTENDED EXPERIMENT OF PEARL PRODUCTION IN THE PHILIPPINE ISLANDS[1]

Originally the term "culture pearl" was applied by Mr. Mikimoto to a hemispherical blister formed over a foreign body artificially inserted between the shell and mantle of a pearl oyster.

[1] We are fortunately able to include under this heading some comments on the production of cultural pearls, which were kindly furnished by Professor Fujita himself.—EDITOR.

These artificially produced blisters are cut off from the shell and used as half pearls. Mr. Mikimoto is the first person who tried to apply this method, which has been practiced in China for several hundred years with fresh-water mussels, to the Japanese pearl oyster, *Margaritifera martensi* Dunker. His success was remarkable, resulting in a large culture farm which supplies the world with about 300,000 yens' worth of culture pearls annually.

His next effort was to improve this culture-pearl method and to produce free, perfectly round pearls. This was rewarded with some degree of success. By a modification of his culture-pearl method, free round pearls are produced; but the method is not reliable, as many operations are required to produce a very small number of free pearls.

In about 1905 Dr. P. Nishikawa, a graduate of the zoölogical department of the Tokyo Imperial University and an expert of the Imperial Fisheries Bureau, discovered a new method of producing free round pearls by pearl-producing mollusks. By this method, which is based upon a totally different principle from that of Mikimoto's, the number of pearls produced is usually from 20 to 50 per cent of the number of operations. He could not see the final result of his own method because of his much lamented death in 1909, although many young pearls were already produced. The experiment was taken up by Fujita after 1908, and some necessary improvements were made; while Mr. S. Nishikawa, junior brother of the late Doctor Nishikawa, working upon a practical basis with his brother's method in his private pearl-culture farm, also accomplished some very remarkable improvements.

The pearls produced by this method, the "Nishikawa method," are free round pearls not distinguishable from natural ones. By several modifications of the method pearls of different structures also can be produced, besides pearls with a structure identical with a natural one in every respect.

As the result of the experiment with the common Japanese pearl oyster is satisfactory to some degree, the method was extended by Fujita to the so-called black-lip pearl oyster, *Margaritifera margaritifera* Linnæus, in southern Japan. The result was satisfactory to some degree.

As the logical sequence of the experiments above described, it is of not a little interest to science and marine industry to test this method with the large gold-lip pearl oyster, *Margaritifera maxima* Jameson. Although the experiments with the Japanese pearl oyster and the black-lip pearl oyster are satis-

factory to a certain degree, there still remains very much to be done before the method can be called very efficient. These necessary experiments can be done only with the gold-lip pearl oyster.

There are two advantages which invite the application of the method to the gold-lip oyster. They are:

1. The large size of the gold-lip shell. A full-grown Japanese pearl-oyster shell is about 7 or 8 centimeters in height and length and only 3 or 4 millimeters in thickness. These figures show how small the Japanese pearl-oyster shell is compared with that of the gold-lip pearl oyster and indicate the difference of the nacre-secreting capacity of the corresponding organisms.

2. The period of nacre-secreting activity. By experiment with the Japanese pearl oyster I have been able to prove that the nacre-secreting function is active from June to November when the temperature of sea water is about 17°C. In the remaining months it is practically at rest, although there is a very slight degree of nacre secretion. In the warm tropical waters it is probably never at rest while the organism is in healthy condition. My experiment with *Margaritifera margaritifera* Linnæus in Pelew Island, West Carolines, in February, 1915, has proved that the nacre secretion was active at that time.

This is the present state of the problem of artificial pearl production in Japan and the reason which urged me to attempt the present scientific trip to the Philippine Islands.

My plan for the intended experiment here is as follows, provided that the necessary permission is granted by the Government:

To get young, live specimens of *Margaritifera maxima* having a nacre measurement of about 10 centimeters height. This is the most, if not the only, convenient size to work with. After these oysters have been operated upon in a proper way, they will be kept alive in the sea, either scattered over the bottom or suspended in wire baskets some distance above the bottom. From time to time a number of these operated oysters are to be taken out and opened to see the result of the operation.

On the other hand, it is very important to ascertain whether it is possible to collect very young spats of *Margaritifera maxima* and to rear them to full-size, adult animals, protecting them from devouring enemies and adverse circumstances by some suitable device, in order to secure the constant supply of the material to work upon in future.

For the purpose of carrying out the scientific experiment relating to the artificial pearl production by *Margaritifera max-*

ima Jameson as described in the accompanying paper, I request the special permission of the Government for the following two items:

1. To fish one thousand five hundred young *Margaritifera maxima* Jameson of less than the standard size.

2. To keep the operated *Margaritifera maxima* in the sea as indicated in the accompanying chart [4] and to close this area for molluscan fishery.

AMOUNT AND VALUE OF PEARL SHELLS EXPORTED FROM THE DEPARTMENT OF MINDANAO AND SULU

During the year 1913 [5] 296,726 kilograms of gold-lip pearl shells, valued at 329,140 pesos, were exported from Jolo, and for the same period 4,068 kilograms, valued at 20,358 pesos, were exported from Zamboanga, a total from the Department of Mindanao and Sulu for 1913 of 300,794 kilograms, valued at 349,498 pesos. In 1907 the amount of these shells exported from Moro Province was 189,720 kilograms valued at 164,399 pesos. There is no record to show the value of the pearls taken, but I have been informed on reliable authority that more than 1,000,000 pesos were handled by the local banks in payment for pearls in 1913. During three months (June to August, 1914) of my inspection trip I examined eight pearls taken during that period, the total value of which was 20,000 pesos. In addition, many small pearls were secured. It is well known that the Philippine beds yield a far greater percentage of pearls than the Australian or Celebes fisheries, but as no accurate records are kept regarding their number or value, it is obviously impossible to give more than this rough estimate.

In addition to numerous local dealers in pearls, there are three pearl buyers from Paris who make their headquarters in Jolo. All seem to be doing a reasonably good business.

The price of pearl shells at the present time is from 60 to 90 pesos per picul,[6] depending on the grade.

THE PEARLING FLEET

In 1914, when I attempted to prepare a detailed list of the pearling boats, I found that several official lists were kept. The two most important of these are in the hands of the treasurer

[4] No copy of the chart was furnished with the manuscript.—EDITOR.

[5] From reports kindly furnished by the Collector of Customs at Jolo and at Zamboanga.

[6] One picul equals 63.25 kilograms.

and of the collector of customs of Jolo, respectively. There were fifty-seven licenses in force in the district of the treasurer of Jolo and sixty-one pearling boats operating according to the list of the collector of customs. Boats were recorded on each list which were not on the other; that of the collector of customs contained the names of ten boats not on the treasurer's list. After comparing all available official records, actually counting as many of the boats as possible, eliminating wrecked boats and those having only dead licenses, and including seven boats operating under licenses issued at Zamboanga, I have prepared the following list of seventy-three boats which represents the entire pearling fleet:

Pearling boats owned by Americans. Total, 2.

Boat.	Owner.
1. Gregorio	H. McLain.
2. Gwendolyn	J. Maddy.

Pearling boats owned by Arabs. Total, 2.

Boat.	Owner.
3. Al Masauat	Abu Bakar.
4. Stamboul	Said Bakar.

Pearling boats owned by Chinese. Total, 2.

Boat.	Owner.
5. Alice Holmes	To Seock.
6. Dayang Dayang	Ong Tiam Tong.

Pearling boats incorporated as the Pearl Fishing Company, Incorporated, which is for the most part owned by Ong Tiam Tong and Tandico. Total, 13.

7. Cebu.
8. Dogmar.
9. General Wood.
10. Helena.
11. Iloilo.
12. Manila.
13. Serena.
14. Victoria.
15. Siasi.
16. Eng Lee.
17. Admiral Dewey.
18. Cherry.
19. Betty Pickle.

Pearling boats owned by Moros. Total, 7.

Boat.	Owner.
20. Paduka	Sultan of Sulu.
21. Malona	Do.
22. Yabloogal	Hadji Gulam.
23. Rajah Loud	Hadji Butu.
24. Pangian	Daughter of Sultan of Sulu.
25. Patrol Bab (Potchbop)	Moro Kumbu.
26. Lily	Jahaila, wife of Schuck.

Pearling boats, owners unknown, but operating through the Jolo custom-house and not on treasurer's list. Total, 5.

27. Morin.
28. Sri Pangan.
29. South Island.
30. Tom Sego.
31. N. S. de Esperanza.

Pearling boats owned by Japanese. Total, 2.

Boat.	Owner.
32. Mayon	Hama.
33. Mindanao	Malamoto.

Pearling boats owned by Sulu Pearling Company (all Japanese). Total, 31.

34. Tenyo.
35. Panama.
36. Cleopatra.
37. Reina.
38. Alfonso.
39. Tubigan.
40. Kumano.
41. Seiriki.
42. Bantayan.
43. Isabela.
44. Tulian.
45. Nautilus.
46. Washington.
47. Rene.
48. Koun.
49. Totsuki.
50. Akebono.
51. Jolo.
52. Maritana.
53. Satsuki.
54. Sulu.
55. Angelita.
56. Three Cheers.
57. Zamboanga.
58. Alexandra.
59. Togo.
60. Catharine.
61. Shunyo.
62. Toyo.
63. Basilan.
64. Nema.

Pearling boats owned by Ohta Development Company.

[All Japanese.]

No.	Name.	Built.	Masts.	Diving gear.
65	Takachiue	Zamboanga, 1913	2	Heinke, type B, compressor set, 10-horsepower kerosene engine.
66	Rosario	do	2	Heinke, 3-throw hand pump.
67	Kii	do	2	Japanese pump.
68	Marie N.	do	2	Heinke special, Darnley pump.
69	Cagayan	do	1	Japanese pump.
70	Albay	do	2	Heinke, 3-throw pump.
71	Paragua	do	2	Do.
72	Happay	Zamboanga, 1914	2	Seibe-German pump.
73	Daishe	Jolo, 1912	2	Heinke, 3-throw pump.

The difficulty of ascertaining the actual number of boats in operation is shown by the following:

On April 14, 1914, the attorney for the Sulu Pearling Company gave me a list of twenty-nine boats belonging to this

company. On May 5, 1914, a Japanese member of the company gave me a list which showed the number of boats as thirty-one. The actual number of boats operating through the Jolo customhouse that claim to belong to this company is thirty-five. When I visited these boats and asked each capatas who owned the boat, each gave the name of the individual Japanese and not one gave the Sulu Pearling Company as owners. I quote the following from a local newspaper:

> The Ohta Development Company have combined with the Sulu Pearling Company, taking over the latter company which gives the Ohta Development Company 46 pearling boats.—*Mindanao Herald of May 23, 1914.*

COST OF OPERATING A PEARLING BOAT

Statements of the cost of operating a pearling boat were secured from most of the principal pearlers. These statements ranged from 250 to 450 pesos for one month.

Average cost of operating a pearling boat.

Item.	Per month.	Per year.
	Pesos.	*Pesos.*
5 sailors, at 17 pesos	85	1,020
1 tender	40	480
1 diver	[a] 20	240
License for 3 months	[b] 25	300
Subsistence	65	780
Overhead expense	140	1,680
4 dresses		360
2 pipes		140
Lost anchors and chains		200
1 coil rope		90
Half cost of sails		150
Interest, 10 per cent on 5,000 pesos		500
Depreciation, 5 per cent		250
Total		[c] 6,190

[a] Plus 8 per cent of the shell.
[b] For three months.
[c] One pearler insisted on adding the following: Loss of advance, 350 pesos; burial expenses, 100 pesos; and loss of time.

The amount paid to the diver is from 20 to 40 pesos per month, with from 8 to 10 per cent of the shells as a bonus. Some owners pay 300 pesos extra for each ton of shells, some pay 20 centavos extra for each shell, some allow the diver 10 pesos per picul for shells and 10 per cent of the pearls. Almost all allow a share in the pearls, ranging from 7 to 12 per cent. All are allowed

advances ranging from 1 to 400 pesos. The great majority of the divers are Japanese.

Two of the pearling boats have recently been equipped with the Hinkey motor-driven air pump, which lowers the cost of operation as compared with the amount of shells taken. These air pumps seem to give perfect satisfaction and certainly increase the factor of safety. The cost of operating the boats with motor-driven pumps is given as 370 pesos per month. They secure more shells.

If the average expense of operating a pearling boat is 300 pesos per month, or 3,600 pesos per annum, the fleet of seventy-four boats expends 266,400 pesos per annum and must earn this amount to clear expenses.

The value of a fully equipped pearling boat is between 2,000 and 8,000 pesos; at an average value of 4,000 pesos the entire fleet is worth 296,000 pesos.

Captain Duncun, who was recently in the Philippine Islands investigating the pearling industry for the Clark Company of Australia, told me he was satisfied that the pearlers were making a fair profit and that his company would like the privilege of bringing in twelve new pearling boats for which they would gladly pay the 300 pesos license in advance, and abide by the law.

One serious phase of the pearl fishery is the high mortality among the divers, which amounted to nine during 1913, and seven up to May 4, 1914. The chief causes seem to be inexperience and ambition to work in deep water. Some means should be devised for correcting these harmful conditions. The owners warn the divers against working in deep water, but the admonitions seem to do no good.

ADMINISTRATION OF THE PEARLING FISHERIES

The old pearling law, Act No. 51 of the Legislative Council of Moro Province, has been a failure; except in as much as it has protected the undersized shells, it has benefited the Japanese only and enabled them to maintain control. The law protected *Margaritifera margaritifera*, which is not the common Philippine pearl oyster, so that the real Philippine pearl oyster, *Margaritifera maxima* Jameson, technically had no protection at all. I believe that the new law (Act No. 2604 of the Philippine Legislature) will correct these defects.

LAW PROTECTING MARINE MOLLUSA[7]

THIRD PHILIPPINE LEGISLATURE, *Fourth Session.* } { C. B. No. 379.

[No. 2604.]

AN ACT FOR THE PROTECTION OF MARINE MOLLUSCA.

By authority of the United States, be it enacted by the Philippine Legislature, that:

SECTION 1. Marine Mollusca, or the shells of such, may be taken without restriction from any open bed, bank, shell field, or other breeding place for shellfish in Philippine waters by any person operating without the use of boat, submarine dredge, rake, or submarine armor. Likewise marine Mollusca whose shells have a value of less than twenty-five pesos per ton may be taken from any open bed, bank, or place by means of any device whatever. The taking of marine Mollusca in Philippine waters under other conditions may be lawfully conducted only under license or permit issued in conformity with the provisions of this Act and subject to restriction and regulation as hereinafter provided.

SEC. 2. Licenses for taking marine Mollusca, or the shells of such, shall be issued and the license fees collected by the Collector of Internal Revenue or his deputies to run for the remainder of the calendar year following the date of issuance. Fees derived therefrom shall accrue to the provincial treasury of the province where the same are collected. During the vitality of such license, the holder may take marine Mollusca anywhere in Philippine waters.

SEC. 3. A license, to be known as the pearling-boat license, may upon payment of the proper fee be issued to any vessel whose registration or ownership is such as is prescribed for vessels engaging in the Philippine coastwise trade.

A pearling-boat license shall not be issued to any vessel owned or operated in whole or in part by a person who has been twice convicted of violating provisions of this Act.

SEC. 4. The Secretary of the Interior shall from time to time prescribe the fee to be paid for the pearling-boat license, or a scale of fees graduated according to the character or capacity of the vessels to be licensed, and shall announce the same in an order which shall be published at least sixty days before becoming effective. Such fee shall in no case be in excess of four hundred pesos per annum, and may be paid quarterly in advance, in the manner prescribed for, and subject to the same penalties for delinquency as fixed internal revenue taxes under Act Numbered Twenty-three hundred and thirty-nine.

SEC. 5. A license, to be known as the first-class shell-diver's license, authorizing the holder to use submarine armor in taking marine Mollusca in Philippine waters, may be issued by the Collector of Internal Revenue or his deputies to any person upon the payment of the required fee.

A first-class shell-diver's license shall not be issued to any person who has been twice convicted of violating provisions of this Act.

[7] *Official Gazette.* Manila (1916), 14, 440. This Act as printed contains minor typographical errors, which have been corrected in this reprint.

SEC. 6. The fee for this license shall be ten pesos per annum, payable in advance.

SEC. 7. It shall be unlawful for any vessel holding a pearling-boat license to employ any unlicensed diver.

SEC. 8. Every licensed vessel shall keep a daily record of the number of shells taken each day. Such record shall be examined and verified by the Collector of Customs or by any internal revenue officer at any port where the owner or master of the vessel may desire to ship, sell, or otherwise dispose of the shells aboard; and no owner or master of any vessel shall discharge shells or otherwise dispose of the shells aboard without inspection by such officer. When the shells have been inspected, the officer shall note the fact in the vessel's log or record book.

SEC. 9. No person employed on a boat engaged in pearl fishing shall open any shell of the pearl oyster of the species *Margaritifera maxima* without the permission of the owner or lessee of the boat.

SEC. 10. When in his opinion the public interest shall so require, the Secretary of the Interior may, by public order, close, either absolutely or qualifiedly, any bed, bank, shell-field, or other breeding place for shellfish in Philippine waters, for any period not exceeding five years. During such closure it shall be unlawful for any person to take therefrom marine Mollusca, or the shells of such, of any prohibited class or to fish for the same therein contrary to the terms of such order.

SEC. 11. The Secretary of the Interior shall fix minimum sizes for the shells which may be taken in Philippine waters of any or all of the following species, to wit: *Margaritifera maxima*, commonly known as the gold-lip pear shell or "concha blanca;" *Trochus niloticus* Linn., commonly known as the "simong" or "trocha;" *Turbo marmoratus* Linn., commonly known as the "bolalo" or "turban shell;" *Margaritifera margaritifera* Linn., commonly known as the black-lip pearl shell or "concha negra." After such restriction shall have been imposed, it shall be unlawful for any person to take, sell, transfer, or have in possession for any purpose any shell or valve of a smaller size than the minimum prescribed for the particular species; but if any such shell should be removed from the water through accident, or in ignorance of its size, no penalty shall be imposed if it be returned to the water immediately without being opened.

SEC. 12. It shall be unlawful for any person to ship or export from the Philippine Islands, or to attempt to ship or export therefrom, the shells of any species mentioned in the preceding section, unless exportation is properly effected through the customhouse at a port of entry.

SEC. 13. The Secretary of the Interior shall have the power, and it shall be his duty, to impose such restriction upon the number of licenses which may be issued for the taking of marine Mollusca in Philippine waters, or upon the number of licensees who may be allowed to operate therein, as shall comport with the requirements of the public interest. A regulation or order imposing such restriction may extend to one or more species and may be made generally applicable in all Philippine waters or be limited to a particular marine area, or areas, therein. The Secretary of the Interior may also cause any application for license to be refused, or order the cancellation of any license, when in his opinion the public interest so requires. The action of the Secretary of the Interior under this section shall be final.

SEC. 14. The Secretary of the Interior may issue special permits to

unlicensed persons authorizing them to take marine Mollusca of any kind or size for scientific purposes or for propagation, subject to such restrictions as he shall prescribe.

SEC. 15. Nothing contained in this Act shall be construed to prohibit the taking of marine Mollusca, or the shells of such, of proper size by naked divers using the customary native boats, rafts, rakes, or dredges in open places.

SEC. 16. The Secretary of the Interior shall make such regulations as shall be necessary for carrying into effect the provisions of this Act, and the Collector of Internal Revenue shall cause a copy thereof to be furnished to each licensee.

SEC. 17. Any person who shall take marine Mollusca, or any shell or valve thereof, in Philippine waters contrary to the provisions of this Act or otherwise violate any provision hereof shall be punished by a fine of not more than one hundred pesos or imprisonment for not more than one month, or both; and if the offense consists in the taking, selling, or transferring of undersized shells of the species *Margaritifera maxima*, or the having of such in possession, the offender shall be fined five pesos for each valve of any shell the subject of the illegal act.

SEC. 18. With the approval of the Secretary of the Interior, the Collector of Internal Revenue may at any stage compromise any case arising under the provisions of this Act.

SEC. 19. The term "Philippine waters," as used in this Act, includes all marine waters pertaining to the Philippine Archipelago, as defined in the treaties between United States and Spain, dated respectively the tenth of December, eighteen hundred and ninety-eight, and the seventh of November, nineteen hundred.

SEC. 20. The term "open," as used in this Act applies to beds, banks, shell-fields, and areas in Philippine waters which have not been brought within the operation of an order of closure promulgated by the Secretary of the Interior pursuant to section ten hereof.

SEC. 21. This Act shall take effect upon its passage.

Enacted, February 4, 1916.

IMITATION PEARLS SOLD IN THE PHILIPPINE ISLANDS

Persons desiring to purchase Philippine pearls should be cautious in parting with their money, for in certain sea ports fraudulent pearls are sold that are merely beads cut from the shells of various mullusks. These "pearls" are of a great variety of colors—red, pink, black, gray, yellow, white, and variegated. The prices asked for them depend apparently upon how prosperous the buyer appears to the vender.

It is well known that all true pearls consist of concentric layers of material around a definite center, a fact that makes the pearl the most difficult of all gems to imitate successfully.

I have made microscopic examinations of thin sections of many kinds of these "pearls," and all of them proved to be shell beads. The first one examined was a fine "red pearl," which the vender assured me came from a triton shell and was a true

pearl. The triton shell is red on the inside and has been known to yield red or pink pearls of value. This "pearl" proved to be a bead cut from the large pearl shell, filed round, stained red, and polished. These red "pearls" were very pretty, ranging in color from pale pink to dark coral red. In size they were usually equal to a very large pea; some were much smaller. Their true value is perhaps 5 centavos each, the prices asked are from 4 to 8 pesos. One jeweler paid 25 pesos for a small lot, believing them to be true triton pearls as stated by the vender.

Another "pearl" examined was a large black one, which the vender assured me came from a pinna shell. The pinna shell is black on the inside and is known to produce black pearls. This black "pearl" also proved to be a piece of shell made into a bead, stained black, and polished. Like the red "pearl" it failed to show any concentric formation, the shell layers extending straight through, instead of around, the central point. These black "pearls" are usually the size of a pea or smaller. They are almost perfectly round, are jet-black, and have a fine polish. Their value is perhaps 3 centavos each; the price asked ranges from 4 to 100 pesos.

Among the fraudulent varieties of so-called pearls there are at times small dark gray or blackish pearls which are more or less flattened and lack the jet-black luster and perfect shape of the so-called black pearls. These are true pearls, probably secured from pinna shells, and possess some small value. They may be easily distinguished from the false pearls by their color and shape. Very small round pearls of a golden luster are secured from a small avicula that has a beautiful golden luster on the inside. The avicula shell is usually less than 6 centimeters in diameter, and I have never seen a pearl produced by this shell that was larger than a number 6 shot. The big, perfectly round yellow pearls offered for sale are usually frauds.

The strombus shell (*tacloban*) produces pearls that are like small china marbles—white, without luster, and of little value—although they are usually of good shape. I have seen specimens larger than pigeon eggs.

THE TOP SHELL AND TURBAN SHELL FISHERIES

The top shell, *Trochus niloticus* Linnæus, and the turban shell, *Turbo marmoratus* Linnæus, are of primary importance in the manufacture of buttons. Locally the top shell is known as the "trocha," or *chin leh*, the turban shell as the "green snail," *turbo*, or *tua leh*. These shells are fairly well described by their

names; the top, or trochus, shell is shaped like a boys' top, and the turban, or green snail, shell is turban-shaped and much larger than the top shell.

There are many places in Sulu waters where these shells are found in abundance. Davao Gulf, the east coast of Mindanao, Tawi Tawi, and Sitanki are well-known fisheries. Wherever there is a good reef or a shore with large rocks, one or both of these shells can usually be secured either by wading along the reef or by naked diving in water of from 1 to 4 fathoms.

The fishermen use these animals for food, and as a result many of the shells are spoiled either by the dry heat or by the hot water, which are employed to extract the animal from its shell. The shells should not be heated, but should be buried in sand for a month and then washed in the sea. Shells cleaned in this way retain their luster and bring the highest price.

HABITS AND LIFE HISTORY

Both the trochus and the turbo are shallow-water shells and are capable of moving about for a considerable distance. Their food consists chiefly of sea moss and other vegetable matter.

The animal reaches maturity in three years. The shell of an adult trochus is about 9 centimeters across the base. An adult turbo is 10 centimeters in diameter on its bottom surface. Very little is known about the early stages of growth of either of these important species. No serious attempt has ever been made to cultivate them artificially, but I have kept them alive in an aquarium for three months. It is possible that both shells could be profitably cultivated provided that a sufficiently confined space with a good food supply could be found. Because of the increasing value of these shells, experiments in actual cultivation would be a most practical matter.

VALUE OF THE SHELLS

Trochus shells at the present time are valued at 28 pesos a picul (63.25 kilograms); in 1909 the shells were valued at from 9 to 10 pesos a picul.

During 1913, 253,395 kilograms of trochus shells, valued at 103,125 pesos, were exported from the Department of Mindanao and Sulu, and during January, February, March, and April, 1914, 85,299 kilograms, valued at 32,969 pesos, were exported.

The turban, or green snail, shell is valued at 26 pesos per picul. During 1913, 65,035 kilograms, valued at 21,860 pesos, were exported from Jolo and Zamboanga. During the first four months of 1914, 7,778 kilograms, valued at 3,127 pesos,

were exported. The greater portion of the shells are sent to Singapore, where they are transshipped.

The rapid increase in value of these shells is due to the increased demand from Japan and the establishment of the second large button factory in Manila.

Large quantities of the young shells, especially of the trochus, have been gathered; in fact, the factories of Japan prefer the small shells, as their machinery is not adapted to use large shells.

The present law (Act No. 2604) is intended to protect the immature shells, and it is now illegal to take trochus shells less than 8 centimeters across the least diameter of the base [8] or to take turban shells less than 9 centimeters across the base.

[8] The "rough form" of trochus shells of 7 centimeters may be taken.

ILLUSTRATIONS

PLATE I

Map, showing the location of the pearl beds of Mindanao and Sulu. (Drawn in the Bureau of Science from Coast and Geodetic Survey charts 4200 and 4722.)

PLATE II

The gold-lip pearl oyster, *Margaritifera maxima* Jameson.

PLATE III

a, a young specimen of the turban shell, *Turbo marmoratus* Linnæus; *b* and *c*, two views of an adult turban shell; *d*, a top shell, *Trochus niloticus* Linnæus, cut through the vertical plane; *e* and *f*, two views of a top shell; *g*, a top shell, showing cuts made for buttons in the partition walls.

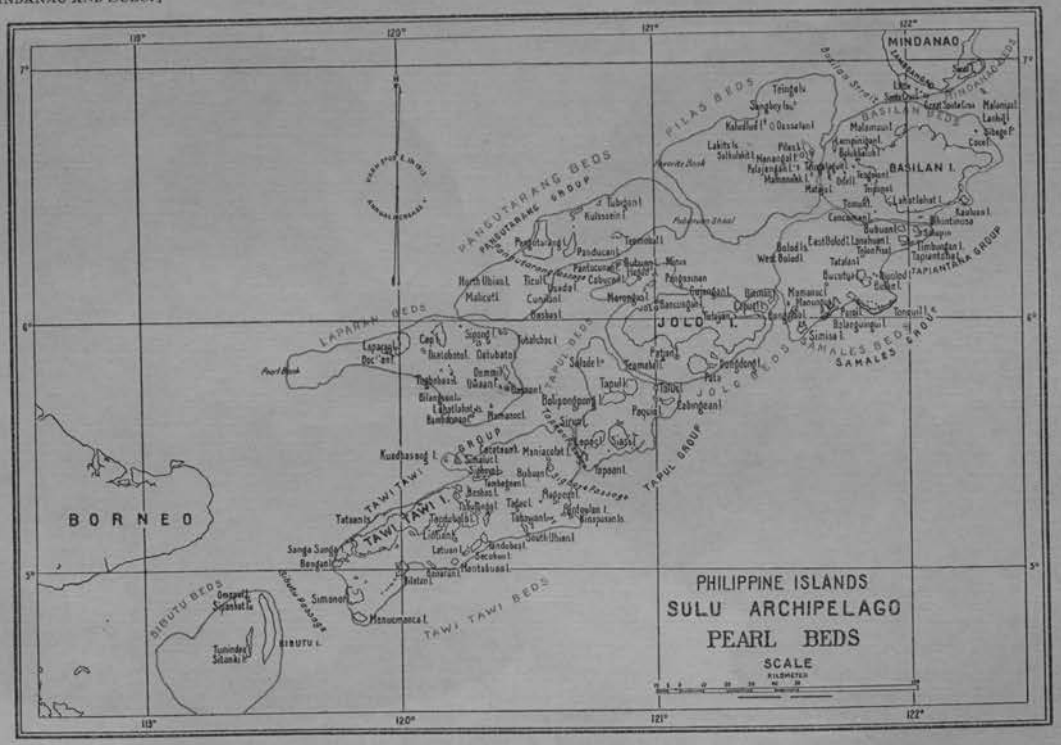


PLATE I. THE PEARL BEDS OF MINDANAO AND SULU.

PLATE II. GOLD-LIP PEARL OYSTER, MARGARITIFERA MAXIMA JAMESON.

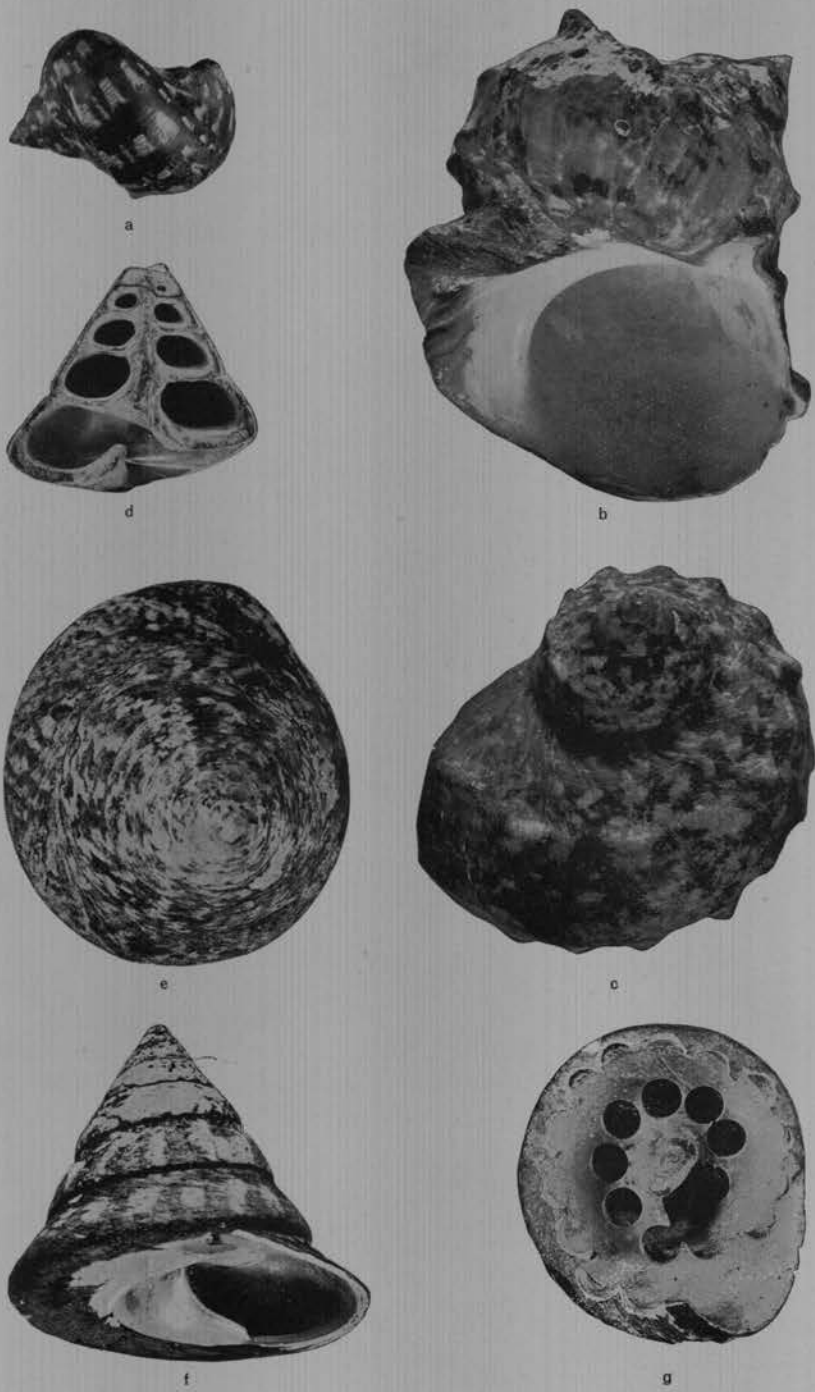


PLATE III. TOP SHELLS AND TURBAN SHELLS.

NESTING OF THE PHILIPPINE GLOSSY STARLING

By PAUL D. BUNKER [1]
(*Corregidor, P. I.*)

April 23, 1916, while at Fort Wint, Subic Bay, Luzon, Philippine Islands, my attention was attracted by a large number of black birds that alighted repeatedly on some rotten piles sticking out of the water in front of the quarters. These wooden piles, the remains of a wharf which formerly existed here, extend about 1.2 meters above high water and are fairly rotten, especially the cores. The range of tide is about 1 meter.

One of these birds would alight on the top of a pile and chatter a second, whereupon its mate would pop up beside it, and after a short conversation the first bird would disappear into a hole in one of the piles and the second bird would fly away. There were from one to two hundred of the piles and almost every rotten one seemed to contain a nest.

The nests consisted of nothing more than the soft punk of rotten wood on which the eggs were laid. One nest contained three young, recently hatched. Another contained the two eggs which I took. They had evidently been incubated for a few days.

The birds appear to be of about the size of the American redwing blackbird or a trifle smaller. Their totally black plumage has a beautiful iridescence, and their irides are flaming scarlet. They are doubtless *Lamprocorax panayensis* (Scopoli), the Philippine glossy starling.

The eggs measure 29 by 19 and 28 by 19 millimeters, respectively, and in color agree with the description given by Grant and Whitehead,[2] except that there are a few scattered markings along the sides of the eggs, beside those at the large end.

[1] Captain, Coast Artillery Corps, United States Army.
[2] See McGregor, Manual of Philippine Birds. Manila (1909), 716.

NEW OR NOTEWORTHY PHILIPPINE BIRDS, I

By RICHARD C. MCGREGOR

(*From the Section of Ornithology and Taxidermy, Biological Laboratory, Bureau of Science, Manila, P. I.*)

TWO TEXT FIGURES

This paper consists of the description of a beautiful new species of wood pigeon and notes on six species of birds that are rare or not previously recorded from the Philippine Islands. I take pleasure in thanking Dr. C. W. Richmond, of the United States National Museum, for identifying some of the latter, and Mr. H. C. Oberholser, of the United States Department of Agriculture, for examining the specimens of *Pycnonotus*.

Leucotreron merrilli sp. nov. Fig. 1.

Leucotreron marchei MCGREGOR, Phil. Journ. Sci., Sec. D (1910), 5, 105 (Polillo); Man. Phil. Bds. (1909), 726.

Specific characters.—Forehead gray; above including wings mostly green; most nearly allied to *Leucotreron marchei* (Oustelet), as indicated by the peculiar red patch on the secondaries, but with no red on head and no red or orange on breast. The feathers of the breast are not decomposed as in *L. marchei*.

Type.—No. 7633, adult male in breeding plumage, Bureau of Science collection. Sarai barrio, Paete, Laguna Province, Luzon, P. I. Collected June 12, 1915, by R. C. McGregor and A. Celestino.

Description of type.—General color above, including wings, forest green, becoming more bluish or yellowish in different positions with regard to the light; chin white; forehead, crown, and sides of head and throat gull gray, strongly tinged with green on occiput, auriculars, and sides of neck, and gradually merging into the clear forest green of neck; lower throat and breast light neutral gray, lightly tinged with green and sharply cut off from the cream-buff of lower breast and abdomen by a narrow pectoral band of dark forest green, this band changing to myrtle green when held toward the light; lower breast and abdomen cream-buff; sides, flanks, and thighs green; under tail-coverts green, broadly edged and tipped with cream-buff; wings green like the back; primaries chætura black, narrowly edged with pale cream-buff; secondaries forest green, the four outermost edged with cream-buff near the tips, 4th to 9th with part of the web de-

composed and garnet brown, forming a conspicuous patch as in *Leucotreron marchei,* but the patch smaller and its color darker than in the latter species; on each feather at the base of the decomposed area a narrow blue streak, about Roslyn blue; feathers of alula chætura black, edged with green; wing-lining, axillars, and greater part of inner webs of primaries and secondaries pecan brown; rectricies above forest green, shafts black, below deep gull gray, the tips paler, shafts white. Iris dark carmine; bill ox-blood red, tip dirty deep chrome; legs, feet, and bare skin around eye ox-blood red; nails buffy brown, tips black. Length, about 340 millimeters; wing, 165; tail, 125; culmen, 15; tarsus 28; middle toe with claw, 39.

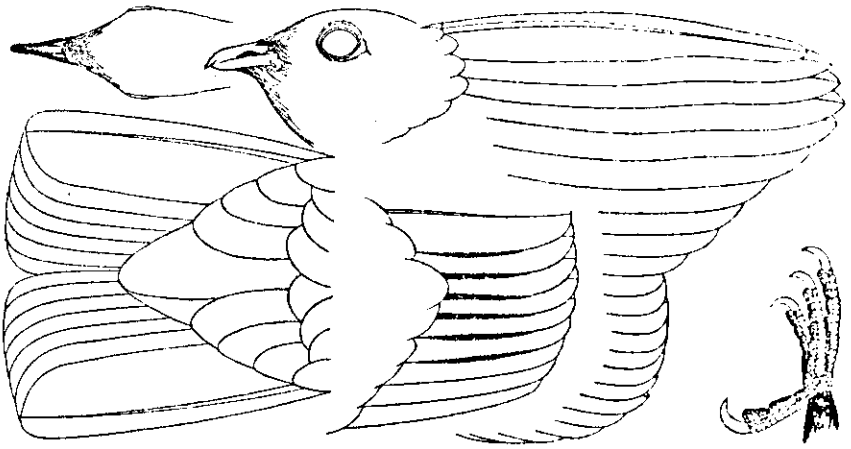


FIG. 1. *Leucotreron merrilli* McGregor, sp. nov., generic details. One-half natural size.

Distribution.—Polillo Island and Laguna and Albay Provinces, Luzon.

Remarks.—This very conspicuous species was discovered in Polillo Island in October, 1909, but the single specimen obtained at that time was recorded as *Leucotreron marchei,* as I suspected that it might be an immature bird. However, six specimens collected near Paete, Laguna Province, Luzon, are adult breeding birds and there can be no doubt that they represent a perfectly distinct species. I have recently examined a living bird of this species which was captured in Albay Province, Luzon. The sexes are alike in plumage.

Specimens of *Leucotreron merrilli* collected in June were feeding on the fruits of *Symplocos ahernii* Brand, a small timber tree of minor importance. It is probable that this species and the other forest-inhabiting pigeons are important agents in the distribution of the seeds of trees.

The species is named for Elmer Drew Merrill, botanist, Bureau of Science, in recognition of his work on the phytogeography of the Philippine Islands.

Platalea minor Temminck and Schlegel. Fig. 2.

Platalea minor TEMMINCK and SCHLEGEL, Fauna Japonica, Aves (1850), 120, Pl. 76; STEJNEGER, Proc. U. S. Nat. Mus. (1887), 10, 4 and 281; O. GRANT, Ibis (1889), 54, Pl. 1, figs. 3, 3*a*, and 6; SHARPE, Cat. Bds. Brit. Mus. (1898), 26, 50 and note on p. 49; Hand-list Bds. (1899), 1, 188; MCGREGOR, Phil. Journ. Sci. (1906), 1, 766; Man. Phil. Bds. (1909), 159.

I have recorded the taking of two specimens of the lesser

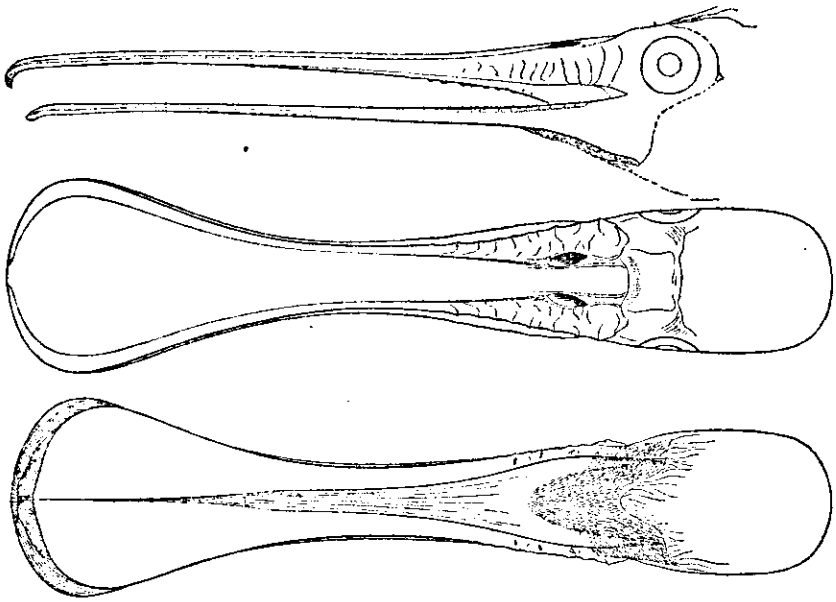


FIG. 2. *Platalea minor* Temminck and Schlegel, three views of the bill, from a specimen collected by Charles S. Banks, at Dagupan, Luzon, P. I. One-half natural size.

spoonbill in Luzon, and in November, 1910, I had the pleasure of seeing living birds of this species near Obando, Bulacan Province, Luzon. I now have additional information regarding this species.

Northwest of Manila the land is low and flat and is traversed by numerous streams that form the delta of the Pampanga and other smaller rivers. A part of this low land has been converted into ponds for the culture of bañgos, *Chanos chanos* Forskål, while an immense area is devoted to the nipa palm, *Nipa fruticans* Wurmb, the source of nipa alcohol. Oysters are cultivated in the larger streams. At low tide wide mud flats are exposed along the shore, and during migrations these

are the feeding grounds of thousands of plovers, sandpipers, and similar shore birds. In November, 1910, headquarters were established at Obando, Bulacan Province, from where it was possible to inspect a large area by means of a banca.

On November 13 a flock of about one hundred common herons, *Ardea cinerea* Linnæus, was seen on the low land near Balauarte barrio. This was an event of importance, for this large heron has seldom been seen in the Islands and there is no definite record of its occurrence in Luzon.[1] With the herons were two white birds, which were easily recognized as spoonbills. The spatulate bill was distinctly seen. Both herons and spoonbills maintained a safe distance between themselves and our guns.

Two days later one spoonbill was observed with the flock of herons. These birds were very shy, and several attempts to stalk the spoonbills were fruitless. During flight this bird appeared to be of about the same size as *Egretta garzetta*, and the bill was very conspicuous because of its size and shape. The spoonbill sailed much more than the herons and seemed to be stronger and steadier in flight.

The spoonbill was well known to my boatmen and others, who stated that it was not common, but was sometimes seen in small flocks. They said that in feeding a distinct clicking sound was produced by the opening and closing of the bill. The local name for this species is *sudsud*. In November, 1912, Celestino was sent to Obando, but failed to see a specimen of the spoonbill. In 1914 the same collector was sent to Dagupan, Pangasinan Province, where he secured a slightly immature female spoonbill on October 26 (Bureau of Science collection, No. 13274). This was the only individual seen. The length of this specimen, taken in the flesh, was 750 millimeters. Measurements taken from the skin are: Wing, 360 millimeters; tail (imperfect), 100; culmen from feathers, 178; occipital crest, 30; bill from nostril, 153; greatest width of bill, 48; least width of bill, 17; tarsus, 123; middle toe with claw, 90; hind toe with claw, 42.

The color notes taken by the collector are:

Ojos pardo, pies y uñas negro, pico pardo blanquizco, el borde de los ojos negro hasta la garganta.

There is a full, broad occipital crest, which is 30 millimeters long. The plumage is entirely white except parts of some of the wing feathers. The shafts of the remiges and of the feathers

[1] Man. Phil. Birds (1909), 164.

of the alula, of the under coverts, and of the larger upper coverts are largely or entirely fuscous-black. Distally the webs of the four outermost primaries are fuscous for a short distance. The webs of the inner primaries and outer secondaries distally are narrowly fuscous next to the shaft.

At the base of the first primary is a small, primarylike feather—entirely fuscous. It measures 48 millimeters, taking its base as being opposite the small, sharp spur on the edge of the wing. Being in doubt as to this feather, I requested Dr. C. W. Richmond to examine the wing of a spoonbill, and under date of November 16, 1915, he replied:

> I have submitted the question of the small primary-like feather on the wing of the *Platalea* to several of our experts here, and they all agree that it is not a primary; and I had already made this decision myself. I do not know just what the mission of the feather is, but it has been noticed before, first, I think, by Baird, who wrote as follows about it in his Review of American Birds, page 325 (note): "In *V* [*ireo*] *flavifrons*, in which this outer primary is supposed to be wanting, its presence may easily be appreciated. One of the peculiar characters of this species consists in a narrow edging of white to all the primary quills, while the primary coverts (the small feathers covering their bases, as distinguished from what are usually termed the wing coverts, which more properly belong to the forearm or secondaries) are without them. If these coverts are carefully pushed aside, two small feathers, considerably shorter than the others will be disclosed, one overlying the other, which (the subjacent one) springs from the base of the exposed portion of the long outermost primary, and lies immediately against the outer edge. This small subjacent feather is stiff, falcate, and edged with white like the other quills, and can be brought partly round on the inner edge of the large primary, when it will look like any spurious quill. The overlying feather is soft, and without light edge.
>
> "In the other *Vireos* with appreciable spurious or short outer primary, a similar examination will reveal only one small feather at the outer side of the base of the exterior large primary. In all the families of Passeres where the existence of nine primaries is supposed to be characteristic, I have invariably found, as far as my examinations have extended, that there were two of the small feathers referred to, while in those of ten primaries but one could be detected." Baird's discovery does not seem to have received the attention it probably deserves.

Ardea cinerea Linnæus.

> *Ardea cinerea* Linnæus, Syst. Nat., ed. 10 (1758), 1, 143; Steere, Bds. and Mams. Steere Exp. (1890), 26; McGregor, Man. Phil. Bds. (1909), 163.

Steere records the common heron from Guimaras Island. The only other Philippine record for the species was based on a damaged skin of unknown origin. I am now able to record two specimens of this species from Luzon. On November 13, 1910,

a flock of at least one hundred common herons was seen near Obando, Bulacan Province, Luzon, and an immature female (Bureau of Science collection, No. 7370) was killed on the 15th. An adult male (No. 13273) was collected by Celestino near Lal-lo, Cagayan Province, December 19, 1913.

Totanus stagnatilis Bechstein.

Totanus stagnatilis BECHSTEIN, Orn. Taschenb. (1803), 11, 293; SHARPE, Cat. Bds. Brit. Mus. (1896), 24, 422; Hand-list Bds. (1899), 1, 160.
Iliornis stagnatilis KAUP, Natürl. Syst. (1829), 156.
Limosa horsfieldii SYKES, Proc. Zool. Soc. London (1832), 163.
Iliornis horsfieldi MATHEWS, Bds. Australia (1913), 3, 200.

Two Philippine bird skins in the Bureau of Science collection have been identified by Dr. C. W. Richmond as *Totanus stagnatilis* Bechstein, a species not recorded from the Philippine Islands. I have before me three other specimens of the same species. All of these were collected in Luzon, as follows:

Measurements of Totanus stagnatilis.

No.	Sex.	Locality.	Date.	Wing.	Tail.	Culmen.	Tarsus.	Middle toe with claw.
				mm.	*mm.*	*mm.*	*mm.*	*mm.*
13276	♀	Obando, Bulacan	Nov. 20, 1912	132	61	39	52	31
13277	♂	do	do	131	58	42	53	31.5
13275	♂	Dagupan, Pangasinan	Oct. 23, 1914	135	60	38	49.5	30.5
13196	♂	Obando, Bulacan	Oct. 12, 1915	143	61	42	54	33
13197	♀	do	do	138	56	41	53	30

It is probable that the Philippine specimens belong to the species *Iliornis horsfieldi* of Mathews, but as I have not the necessary literature and specimens, I shall leave that question to others, contenting myself with recording the species as a migratory visitor to the Philippine Islands.

Pycnonotus plumosus Blyth.

Pycnonotus plumosus BLYTH, Journ. As. Soc. Beng. (1845), 14, 567; SHARPE, Cat. Bds. Brit. Mus. (1881), 6, 152; Hand-list Bds. (1901), 3, 332;[2] OATES, Fauna Brit. India, Bds. (1889), 1, 292.
Laedorusa plumosa BÜTTIKOFER, Notes Leyden Mus. (1896), 17, 240.

[2] The footnote on page 329 of the Hand-list evidently has nothing to do with the genus *Pycnonotus*, but probably was intended to appear on page 315 as a note to the name *Micropus*. See also *Penthornis luzoniensis* (Gm.) Sharpe, Hand-list (1903), 4, 333.

Two specimens of *Pycnonotus* (No. 13206 and 13207), collected on Cagayan Sulu Island, July 1, 1911, are so much darker than the species indigenous to Palawan that I was led to compare them with the scanty exotic material of this genus at hand, and found that they resemble a male of *Pycnonotus plumosus* from Trong, Lower Siam—an Abbott specimen which had been received in exchange from the United States National Museum. In order to avoid any error, the three specimens were sent to Washington. They have been returned with the identification confirmed by Dr. C. W. Richmond and Mr. H. C. Oberholser. This is the first record of *Pycnonotus plumosus* from the Philippine Islands.

Several of the species known from Cagayan Sulu indicate that its fauna is more strongly Bornean than Philippine. These species are:

Eudynamys honorata (Linnæus).
Chibia borneensis Sharpe.
Orthotomus cineraceus Blyth.
Mixornis cagayanensis Guillemard.
Uroloncha fuscans (Cassin).
Pycnonotus plumosus Blyth.

Sporæginthus amandava (Linnæus).

Fringilla amandava LINNÆUS, Syst. Nat., ed. 10 (1766), 1, 319.
Sporæginthus amandava SHARPE, Cat. Bds. Brit. Mus (1890), 13, 320; Hand-list Bds. (1909), 5, 439.

December 6, 1910, Dr. H. C. Curl collected in Pampanga Province, Luzon, a small ploceid which is very distinct from any of the native species. This is doubtless *Sporæginthus amandava.* Shortly after this I found a dead specimen in Manila. In October, 1914, when returning from Dagupan, Celestino noted live birds of this species being offered for sale at Bambang.

I have been told that a shipment of these birds was brought to Manila and that the Collector of Customs refused to let the birds be landed. If this is true, it seems probable that they were permitted to escape and that some reached shore and established themselves.

As members of the Plociidæ are believed to be of considerable economic importance, it is desirable that the supposed approximate date of the introduction of the above species be placed on record.

ILLUSTRATIONS

[Drawings by T. Espinosa.]

TEXT FIGURES

FIG. 1. *Leucotreron merrilli* McGregor, sp. nov., generic details. One-half natural size.

2. *Platalea minor* Temminck and Schlegel, three views of the bill, from a specimen collected by Charles S. Banks at Dagupan, Luzon, P. I. One-half natural size.

NEUER BEITRAG ZUR KENNTNIS DER PHILIPPINISCHEN CYNIPIDEN

Von. J. J. KIEFFER
(*Bitsch, Germany*)

Genus **EUCOILA** Westwood

a ¹. Antenne 14 gliedrig ..... **E. (Episoda) luzonica.**
a ². Antenne 13 oder 15 gliedrig.
b ¹. Körper rotbraun, Kopf schwarz; Napf klein, fast um seine ganze Breite von den Seitenrändern des Scutellum entfernt.... **E. pulchra.**
b ². Körper grösstenteils schwarz; Napf gross, fast die Seitenränder des Scutellum erreichend.
c ¹. Prothorax und Scutellum rotbraun; Abdomen vorn mit einem Haarring ..... **E. manilensis.**
c ². Thorax einfarbig schwarz; Abdomen vorn ohne Haarring, aber mit je einem Haarfleck..... **E. philippinarum.**

Eucoila pulchra sp. nov.

Rotbraun, glatt und stark glänzend. Kopf schwarz, stark quer, von der Seite gesehen doppelt so hoch wie lang, von vorn gesehen höher als breit. Stirn gewölbt. Wange halb so lang wie das kahle Auge. Antenne etwas länger als der Körper, 13 gliedrig, 1. und 2. Glied gelb, 3. und 4. schwach gebräunt, die folgenden schwarzbraun, 2. fast kugelig, 3. doppelt so lang wie dick, kaum kürzer als das 4., 5. so lang wie das 4. und dicker, die folgenden deutlich aber wenig dicker, walzenrund, wenigstens doppelt so lang wie dick, feinhaarig. Thorax kaum länger als hoch, stark gewölbt. Grübchen des Scutellum klein, Napf elliptisch, klein, wenig breiter als sein Abstand vom Seitenrande des Scutellum, sehr seicht eingedrückt, hinten mit einem kreisförmigen Grübchen. Flügel ziemlich glashell, lang bewimpert, Radialzelle geschlossen, drei mal so lang wie breit, 3. Abschnitt der Subcostalis fast punktförmig, Stigmalis (1. Abschnitt der Radialis) so lang wie die Radialis (2. Abschnitt der Radialis) und etwas bogig gekrümmt, Cubitalis durchlaufend. Abdomen vorn mit einer fast kahlen, sehr spärlich fein haarigen Querwulst.

Länge, 1.8 Millimeter.

LUZON, Laguna, Berg Maquiling (*Baker*).

Eucoila manilensis sp. nov.

♂ : Schwarz, glatt und glänzend. Antenne braunschwarz, 15 gliedrig, 1. und 2. Glied schwarz, 3. und 4. rotbraun, 2. kugelig, 3. das längste, drei mal so lang wie dick, kaum bogig gekrümmt, die folgenden ziemlich walzenrund und fast zwei mal so lang wie dick. Thorax kaum länger als hoch, stark gewölbt. Grübchen des Scutellum klein, Napf gross, elliptisch, fast die Seitenränder des Scutellum erreichend, ausgehöhlt. Metapleure mit grauem Haarfilz. Prothorax und Scutellum rotbraun. Flügel glashell, bewimpert, Radialzelle geschlossen und von der Costalis etwas überragt, wenig mehr als zwei mal so lang wie breit, Stigmalis mehr als drei mal so lang wie der 3. Abschnitt der Subcostalis, gerade, kaum kürzer als die Radialis, Cubitalis blass. Beine gelb. Haarring des Abdomen grau und schmal.

Länge, 1.5 Millimeter.

LUZON, Laguna, Los Baños (*Baker*).

Eucoilia philippinarum sp. nov.

♂ : Schwarz, glatt und glänzend. Antenne 15 gliedrig, die 5 proximalen Glieder gelb, die folgenden allmählich gebräunt, 2. Glied kugelig, 3. viel dünner als die folgenden, wenig mehr als doppelt so lang wie dick, 4. deutlich länger als das 3., nicht deutlich bogig, die folgenden so lang wie das 4., nur die letzten dünner und kürzer. Grübchen des Scutellum klein, Napf gross, elliptisch, die Seitenränder fast berührend, ausgehöhlt. Flügel glashell, bewimpert, Radialzelle geschlossen, zwei und ein halb bis drei mal so lang wie breit, Radialis um die Hälfte länger als die Stigmalis, diese bogig und drei mal so lang wie der 3. Abschnitt der Subcostalis, Cubitalis nur spurenweise angedeutet. Beine gelb. Vorderende des Abdomen rotbraun, mit grauen feinen Haaren an den Seiten.

Länge, 1.5 Millimeter.

LUZON, Laguna, Los Baños (*Baker*).

Eucoila (Episoda) luzonica sp. nov.

♂ : Schwarz, glatt und glänzend. Kopf vorn höher als breit. Antenne 14 gliedrig, kaum länger als der Körper, fahlgelb, 3. bis 5. Glied allmählich länger werdend, das 3. gut doppelt so lang wie dick, 6. so lang wie das 5., 6. bis 14. etwas dicker, fast walzenrund, allmählich verkürzt, das 14. jedoch eirund. Thorax deutlich länger als hoch. Grübchen des Scutellum klein, Napf elliptisch, matt, runzlig, die Seitenränder erreichend, hinten hell gerandet und mit einem kleinen kreisrunden Eindruck, Flügel glashell, bewimpert, Radialzelle gross, geschlossen, von

der Costalis sehr wenig überragt, Stigmalis drei mal so lang wie der 3. Abschnitt der Subcostalis, deutlich kürzer als die Radialis, schwach bogig, Cubitalis durchlaufend. Abdomen vorn mit einem wenig breiten rötlichen Haarring.

Länge, 2 Millimeter.

LUZON, Laguna, Berg Maquiling (*Baker*).

Genus COTHONASPIS Hartig

a¹. 15. Glied der Antenne allmählich länger werdend, 4. verdickt. **C. lagunensis.**

a². 15. Glied der Antenne gleich lang, 4. nicht verdickt..... **C. rufata.**

Cothonaspis lagunensis sp. nov.

♂ ♀ : Rotbraun, glatt und glänzend. Kopf schwarz. Antenne des ♂ 15. gliedrig, viel länger als der Körper, rotbraun, 1. und 2. Glied schwarz, das 2. fast kugelig, 3. so dick wie das 2., walzenrund, um die Hälfte länger als dick, 4. nicht bogig aber in der Mitte verdickt, am Grunde ausgeschnitten, länger als das 3., etwas kürzer als das 5., 4. bis 15. allmählich länger und dünner werdend, die letzten mehr als drei mal so lang wie dick. Antenne des ♀ 13 gliedrig, dunkel rotbraun, 2. Glied länger als dick, 3. und 4. gleich, dünner als das 2., um die Hälfte länger als dick, 5. bis 13. etwas dicker, deutlich länger als das 4., die Antenne wenig länger als der Körper. Grübchen des Scutellum klein, das heisst, nicht so lang wie das übrige Scutellum, Napf klein, kurz elliptisch, um mehr als seine Breite von den Seitenrändern getrennt, ausgehöhlt. Mediansegment mit 2 parallelen Längsleisten. Flügel schwach getrübt, bewimpert, Adern blass, Radialzelle am ganzen Vorderrande offen, doppelt so lang wie breit, Stigmalis schwach bogig, deutlich kürzer als die schwächer gekrümmte Radialis, 3. Abschnitt der Subcostalis wenigstens halb so lang wie die Stigmalis, Cubitalis sehr blass. Beine gelbrot. Abdomen vorn mit einem sehr schmalen, grauen Haarring.

Länge, 1.8 Millimeter.

LUZON, Laguna, Los Baños und Berg Maquiling (*Baker*).

Cothonaspis rufata sp. nov.

♂ : Rotbraun, glatt und glänzend. Kopf schwarz, vorn höher als breit. Antenne 15 gliedrig, dunkel rotbraun, 3. bis 15. Glied gleichlang, etwas länger als dick, so dick wie das 2. Glied. Thorax wenig länger als hoch, stark gewölbt. Grübchen des Scutellum klein; Napf klein, elliptisch, so breit wie sein Abstand von den Seitenrändern, ausgehöhlt. Flügel glashell, bewimpert,

Radialzelle am ganzen Vorderrande und ein wenig am Distalende offen, zwei und ein halb mal so lang wie breit, Stigmalis schwach bogig, halb so lang wie die Radialis, doppelt so lang wie der 3. Abschnitt der Subcostalis, Cubitalis wenig deutlich. Beine rot. Haarring des Abdomen grau und schmal.

Länge, 1.8 Millimeter.

LUZON, Laguna, Berg Maquiling (*Baker*).

Genus ERISPHAGIA A. Förster

a^1. Napf des Scutellum klein, um seine ganze Breite von den Seitenrändern des Scutellum entfernt ..... E. cupulifera.

a^2. Napf des Scutellum gross, um seine halbe Breite von den Seitenrändern entfernt ..... E. philippinensis

Erisphagia cupulifera sp. nov.

♂ : Schwarz, glatt und glänzend. Antenne länger als der Körper, 15 gliedrig, 1. und 2. Glied gelb, das 3. kürzer als das 4., doppelt so lang wie dick, die folgenden allmählich etwas länger, walzenrund. Grübchen des Scutellum sehr klein; Napf klein, kurz elliptisch, fast kreisrund, um seine ganze Breite von den Seitenrändern entfernt, hintere Hälfte mit kreisrundem Eindruck. Flügel glashell, Radialzelle geschlossen, zwei und ein halb mal so lang wie breit, Stigmalis deutlich kürzer als die Radialis, 3. Abschnitt der Subcostalis nicht halb so lang wie die Stigmalis, Cubitalis durchlaufend. Abdomen ohne Haarring.

Länge, 1.3 Millimeter.

LUZON, Laguna, Berg Maquiling (*Baker*).

Erisphagia philippinensis sp. nov.

♀ : Schwarz, glatt und glänzend. Antenne 13 gliedrig, 3. bis 7. Glied gelb, 8. bis 13. dunkelbraun, das 2. kugelig, 3. dem 4. gleich, dünner als das 2., 3 bis 4 mal so lang wie dick, am Distalende etwas verdickt, 5. und 6. so dünn wie das 4., aber allmählich kürzer, das 6. noch mehr als zwei mal so lang wie dick, die 7 Endglieder verdickt, eine Keule bildend, fast doppelt so lang wie dick, ziemlich walzenrund. Grübchen des Scutellum klein; Napf ziemlich gross, elliptisch, um seine halbe Breite von den Seitenrändern getrennt, ausgehöhlt, fein punktiert. Flügel glashell, bewimpert, Radialzelle geschlossen, zwei und ein halb mal so lang wie breit, Radialis bogig, um die Hälfte länger als die Stigmalis, diese fast drei mal so lang wie der 3. Abschnitt der Subcostalis, Cubitalis blass, nicht durchlaufend. Abdomen vorn ohne Haarring und ohne Wulst.

Länge, 1.5 Millimeter.

LUZON, Laguna, Los Baños.

Genus GANASPIS A. Förster

a ¹. Radialzelle am Vorderrande offen ..... G. aperta.
a ². Radialzelle ringsum geschlossen.
b ¹. Napf des Scutellum klein, nicht breiter als sein Abstand von den Seitenrändern, Grübchen länger als das übrige Scutellum, 3. Antennenglied stark bogig ..... G. validicornis
b ². Napf des Scutellum gross, fast die Seitenränder erreichend, Grübchen viel kürzer als das übrige Scutellum, 3. Antennenglied kaum bogig beim ♂.
c ¹. Abdomen vorn mit Haarring, Stigmalis etwas kürzer als die Radialis ..... G. hexatoma.
c ². Abdomen vorn ohne Haarring, Stigmalis nicht kürzer als die Radialis ..... G. minima.

Ganaspis aperta sp. nov.

♂ : Schwarz, glatt und glänzend. Antenne rotbraun, 1. und 2. Glied schwarz, das 2. kuglig, das 3. das längste, kaum bogig, drei mal so lang wie dick, 4. bis 15. gut anderthalb mal so lang wie dick. Grübchen des Scutellum sehr klein, nicht halb so lang wie der Napf, dieser gross, gewölbt, ohne Rand, hinten mit einem kleinen, kreisförmigen Eindruck, die Seitenränder des Scutellum erreichend. Mediansegment mit 2 parallelen Längsleisten. Metapleure graufilzig behaart. Flügel glashell, bewimpert, Radialzelle am ganzen Vorderrande offen, zwei und ein halb mal so lang wie breit, Radialis schwach bogig gekrümmt, fast doppelt so lang wie die Stigmalis, diese doppelt so lang wie der 3. Abschnitt der Subcostalis. Beine gelbrot, Coxæ schwarz. Haarring des Abdomen grau und sehr schmal.

Länge, 1.5 Millimeter.

LUZON, Laguna, Los Baños; Tayabas, Berg Banahao (*Baker*).

Ganaspis validicornis sp. nov.

♂ : Schwarz, glatt und glänzend. Wange mit einer Furche. Antenne rotbraun, länger als der Körper, 15 gliedrig, 2. Glied kugelig, 3. stark bogig gekrümmt, distal verdickt, das längste von allen, 4. fast drei mal so lang wie dick, die nächst folgenden dem 4. gleich, die 6 oder 7 letzten allmählich dünner und kürzer. Thorax etwas länger als hoch, stark gewölbt. Grübchen des Scutellum gross, länger als ihr Abstand vom Hinterende des Scutellum; Napf klein, elliptisch, um seine Breite von den Seitenrändern entfernt, stark gewölbt und ohne Rand. Flügel glashell, bewimpert, Radialzelle geschlossen, von der Costalis kaum überragt, zwei und ein halb mal so lang wie breit, Radialis schwach bogig, um die Hälfte länger als die Stigmalis, diese gerade, fast

doppelt so lang wie der 3. Abschnitt der Subcostalis, 2. Abschnitt der Cubitalis am Grunde bogig, durchlaufend, blass. Haarring des Abdomen fahlgelb, wenig dicht, sehr schmal.

Länge, 1.8 Millimeter.

LUZON, Tayabas, Malinao (*Baker*).

Ganaspis hexatoma sp. nov.

♀ : Schwarz, glatt und glänzend. Antenne 13 gliedrig, dunkel rotbraun, 3. Glied doppelt so lang wie dick, 4. bis 7. gleich dünn, nicht länger als dick, Keule abgesetzt, 6 gliedrig, ihre Glieder fast kuglig, das Endglied eirund. Grübchen des Scutellum klein, Napf gewölbt, elliptisch, nicht gerandet, mässig gross. Flügel glashell, Radialzelle geschlossen, zwei mal so lang wie breit, Stigmalis etwas kürzer als die Radialis, beide schwach bogig, 3. Abschnitt der Subcostalis nicht halb so lang wie die Stigmalis, Cubitalis blass, durchlaufend. Beine lehmgelb. Haarring des Abdomen fahlgelb.

Länge, 1 Millimeter.

LUZON, Laguna, Berg Maquiling (*Baker*).

Ganaspis minima sp. nov.

♂ : Schwarz, glatt und glänzend. Antenne 15 gliedrig, die 3 proximalen Glieder hellgelb, 4. bräunlich, 2. Glied fast kugelig, 3. walzenrund, fast drei mal so lang wie dick, 4. etwas länger als das 3., kaum bogig, die folgenden so lang wie das 4. Grübchen des Scutellum klein; Napf gross, fast die Seitenränder erreichend, stark gewölbt, hinten mit einem kreisrunden Eindruck, nicht gerundet. Flügel glashell, bewimpert, Radialzelle geschlossen, zwei und ein halb mal so lang wie breit, Stigmalis und Radialis gleichlang, 3. Abschnitt der Subcostalis nicht ein Drittel so lang wie die Stigmalis. Beine hellgelb. Abdomen vorn rot und verengt, ohne Haarring.

Länge, 0.8 Millimeter.

LUZON, Laguna, Los Baños (*Baker*).

ASPICERINÆ

Genus **HOLOCYNIPS** novum

Auge gross und kahl. Antenne des ♂ 14 gliedrig. Parapsidenfurchen fehlend. Scutellum stumpf kugelig und stark gewölbt. Radialzelle geschlossen, 1. Cubitalzelle fast am ganzen Hinterrande offen, 2. Cubitalzelle fehlt. Krallen einfach. Ab-

domen seitlich zusammengedrückt, an einem ringförmigen Fortsatz des Metathorax, etwas über den hinteren Coxae entspringend, Petiolus ringförmig, 2. und 3. Tergit gleich lang, fast zungenförmig, 4. seitlich länger als die folgenden zusammen, dorsal kürzer als diese, das längste von allen, die 3 oder 4 folgenden kurz, Hinterende des Abdomen allmählich abgerundet. Type, *Holocynips nigra* sp. nov.

Holocynips nigra sp. nov.

♂ : Schwarz, matt. Kopf stark quer und grob runzlig, von vorn gesehen kaum höher als breit; Stirn lederartig, mit einigen zerstreuten groben Punkten und je einem Längskiel von der hinteren Ocelle bis zur Mandibel. Wange lederartig, gut halb so lang wie das Auge. Schläfe grob gerunzelt, längs des zugeschärften Randes tief eingedrückt. Ocellen auf einer Erhöhung des Scheitels liegend, ein Dreieck bildend, zwischen der hinteren und dem Auge ist der Scheitel tief eingedrückt; hinter jedem Scapus befindet sich eine tiefe, glatte und glänzende Längsgrube. Mandibel braun. Antenne 14 gliedrig, weit nach hinten, nämlich hinter der Mitte der Augen, entspringend, der vorderen Ocelle viel näher als dem Munde, Scapus schwarzbraun, 2. Glied fast kugelig, 3. kaum länger als des Scapus, fast doppelt so lang wie dick, walzenrund, die folgenden dem 3. gleich, 14. länger, gut 2 mal so lang wie dick. Thorax wenig länger als hoch, stark gewölbt, dorsal grob fingerhutartig punktiert, die Punkte fast napfförmig und benabelt. Prothorax vorn senkrecht abgestutzt. Pronotum in der Mitte sehr schmal. Scutellum vorn mit 2 tiefen, glatten, glänzenden und nur durch eine Leiste voneinander getrennten Gruben. Mesopleure unten mit einer tiefen, gekerbten Längsrinne. Vorderflügel fast glashell, Radialzelle und ihre Umgebung dunkelbraun, Radialzelle geschlossen, dreieckig, in dem die Stigmalis und der 3. Abschnitt der Subcostalis dieselbe fast senkrechte Richtung haben, letzterer gut halb so lang wie erstere, Radialis gerade, wenigstens doppelt so lang wie die Stigmalis, 1. Abschnitt der Cubitalis sehr kurz, seine Fortsetzung würde den Grund der Basalis erreichen, 2. Abschnitt blass, durchlaufend. Vordere Tibia und alle Tarsen lehmgelb, hintere Coxa sehr lang und dick, Hinterbein verdickt. Abdomen glatt und glänzend, Petiolus quer, grob längsgerieft.

Länge, 3.5 Millimeter.

PALAWAN, Puerto Princesa (*Baker*).

LIOPTERONINÆ

Genus **ALLOCYNIPS** Kieffer

Allocynips flaviceps sp. nov.

♀ : Schwarz. Kopf fast drei mal so breit wie lang, ziemlich matt. Scheitel eingedrückt, die Stelle der Ocellen erhaben. Stirn mit je einem Längskiel zwischen Scapus und Auge bis zum Scheitel; ferner geht von jeder Ocelle ein Kiel nach vorn aus, diese 3 Kiele vereinigen sich zu einem Einzigen zwischen den Antennen; der Raum zwischen dem Randkiel und den 3 medialen Kielen ist tief rinnenartig eingedrückt. Gesicht gewölbt, mit Spuren einer netzartigen Runzelung, vorn mit je einer matten, kreisrunden Grube. Wange ohne Furche, gut halb so lang wie das Auge. Schläfe glatt. Antenne vor der Mitte der Augen entspringend, 13 gliedrig, Scapus schwarzbraun, kaum länger als das 3. Glied, 2. Glied fast so dick wie lang, 3. walzenrund wie die folgenden, gut zwei und ein halb mal so lang wie dick, 4. deutlich länger als das 3., die folgenden allmählich verkürzt, 12. noch gut anderthalb mal so lang wie dick, 13. mehr als doppelt so lang wie dick. Thorax fast doppelt so lang wie hoch, ziemlich gewölbt, glänzend. Prothorax und Mesonotum lehmgelb. Pronotum vorn senkrecht abgestutzt, hinten schmal bogig ausgeschnitten, seitlich grob und ziemlich dicht punktiert. Mesonotum wenigstens so lang wie breit, mit groben, queren Kielen. Parapsidenfurchen durchlaufend, nach hinten konvergierend. Scutellum anderthalb mal so lang wie breit, grob netzartig gerunzelt, hinten abgerundet, vorn mit 2 grossen, etwas queren Gruben, die nur durch eine Leiste voneinander getrennt sind. Pleuren fein weiss behaart, besonders die Metapleure; Mesopleure in der Mitte kahl, glatt, glänzend, mit einer durchlaufenden Längsrinne. Flügel bräunlich, am Vorderflügel sind die 1. Cubitalzelle, die Radialzelle und das proximale ein Drittel der offenen 2. Radialzelle dunkelbraun, 1. Cubitalzelle geschlossen, die Cubitalis entspringend vor (oberhalb) der Mitte der Basalis, 2. Abschnitt der Cubitalis fast durchlaufend, Radialzelle geschlossen, länger als die Cubitalzelle, Radialis gerade, zwei und ein halb mal so lang wie die Stigmalis, diese doppelt so lang wie der 3. Abschnitt der Subcostalis; Areola fehlend. Beine lehmgelb, Coxa und Trochanter der 4 hinteren Beine, sowie hinterer Tarsus schwarz, mittlerer Tarsus braun, Hinterbein dicker als die übrigen, ihre Coxa doppelt so lang wie die mittlere. Abdomen seitlich zusammengedrückt, etwas höher als die hintere Coxa entspringend, so lang wie der übrige Körper,

Petiolus quer, grob gerieft, 2., 3., und 4. Tergit stark quer, seitlich schräg bis zum Petiolus reichend, jedoch nicht zungenförmig, 5. das längste, in der hinteren Hälfte seitlich mässig grob punktiert und mit dichten rostroten Haaren, 6. kurz, seitlich mitten grob punktiert und rostrot dicht behaart, 7. wie das 6., aber die Punkte noch dichter und, wie die Haare, am Hinterende vorhanden; seitlich ist das Abdomen vom 5. und 6. Tergit gedeckt, ventral erscheint nur 1 langes Sternit, das stark kielförmig vorstehend, vom Grunde ausgeht und hinten in einen länglichen Bauchdorn ausläuft, dieser zwei bis drei mal so lang wie breit.

Länge, 8 Millimeter.

MINDANAO, Butuan (*Baker*).

BESCHREIBUNG EINER NEUEN MYMARIDE AUS DEN PHILIPPINEN

Von J. J. KIEFFER
(*Bitsch, Germany*)

Polynema loriger sp. nov.

♂ : Lehmgelb; Dorsalseite des Thorax und Hinterende des Abdomen gebräunt; die 4 vorderen Beine blassgelb, Hinterbein schwarz, Coxa und Trochanter blassgelb, 2. und 3. Glied des Hintertarsus sowie Distalende des 1. weiss. Kopf von oben gesehen fast quadratisch, etwas breiter als der Thorax, glatt, glänzend; seitlich gesehen, fast dreieckig, so lang wie hoch. Stirn kurz, durch eine schwarze Querleiste vom Scheitel getrennt. Gesicht viel länger als die Stirn, stark gewölbt. Wange kaum kürzer als das kreisrunde, kahle Auge, stark gewölbt. Ocellen ein gleichschenkliges Dreieck bildend, die hinteren um mehr als ihren Durchmesser vom Auge getrennt, noch weiter voneinander entfernt. Antenne das Abdomen weit überragend, 13 gliedrig, Scapus ventral erweitert, wenig länger als das 2. Glied, dieses kaum länger als dick, 3. fadenförmig, vier bis fünf mal so lang wie dick, die folgenden kaum länger als das 3., von oben gesehen fünf bis sechs mal so lang wie dick, stark seitlich zusammengedrückt, von der Seite gesehen 2 mal so hoch wie das 3., fast drei mal so lang wie breit, das Flagellum daher riemenförmig.

Thorax sehr lang, gut drei mal so lang wie hoch, glatt, glänzend, wenig gewölbt. Pronotum etwas länger als breit, weit vor den Tegulæ aufhörend, mit einem Mittellängseindruck. Mesonotum kaum länger als das Pronotum, sehr fein punktiert; Parapsidenfurchen durchlaufend, vorn divergierend. Scutellum so lang wie das Mesonotum und starker gewölbt, länglich, hinten abgerundet. Metathorax sehr klein.

Flügel glashell, das Abdomen um ein Drittel überragend; Vorderflügel in den distalen zwei Drittel allmählich erweitert, am Ende breit abgerundet, Wimperhaare des Hinterrandes ein Viertel so lang wie die grösste Flügelbreite, Flügelfläche mit 5 bogenförmig gekrümmten Längsreihen von kleinen Haaren, Subcostalis das proximale ein Viertel kaum überragend, am Ende kolbig verdickt. Hinterflügel sehr schmal, zugespitzt, Wimperhaare viel länger als die Flügelbreite. Vorderbein nahe am Vorder-

ende, Mittelbein und Hinterbein nahe am Hinterende des Thorax entspringend; Coxa und Trochanter des Vorderbeines lang, bis unter die Tegula reichend, Bein dünn wie auch das Mittelbein; Hinterbein stark verlängert, Coxa und Trochanter zusammen den Petiolus überragend, verdickt wie auch das Femur, die Tibia und der Metatarsus, Tibia und Metatarsus mit langen abstehenden Haaren, die Haare vier bis fünf mal so lang wie die Dicke des Beines, Metatarsus zwei mal so lang wie die 3 folgenden Glieder zusammen, diese dünn und länglich. Petiolus lang, zwei Drittel so lang wie der Thorax, etwas länger als das übrige Abdomen, dieses ellipsoidal, die Mitte des hinteren Femur nicht erreichend.

Länge, 2 Millimeter.

LUZON, Laguna, Berg Maquiling (*C. F. Baker*).

II. BEITRAG ZUR COLEOPTEREN FAUNA DER PHILIPPINEN

Von W. SCHULTZE
(*Manila, P. I.*)

MIT ZWEI TAFELN

PAUSSIDÆ

PROTOPAUSSINÆ

Genus **MONOPAUSSUS** novum

Körperform länglich, flach gedrückt, halb so breit wie lang; Seiten der Flügeldecken parallel. Kopf relativ gross. Lippentaster dreigliedrig, das dritte Glied doppelt so lang wie das zweite. Maxillartaster viergliedrig, erstes Glied das kleinste, konisch, zweites Glied das längste, keulenförmig, das dritte Glied ebenfalls konisch jedoch sehr kurz, viertes Glied sehr gross und becherförmig. Fühler elfgliedrig, perlschnurförmig.

Type, *Monopaussus piceus* sp. nov.

Dieses Genus unterscheidet sich von *Protopaussus* besonders durch das letzte Maxillartasterglied und durch das ganz anders geformte Halsschild und die Flügeldecken. Erwähnt Fowler[1] im besonderen die ausgesprochene Ähnlichkeit von *Protopaussus* mit Carabidenformen, so kommt das Genus *Monopaussus* den letzteren noch näher.

Monopaussus piceus sp. nov. Tafel I, fig. 3 *a–b*.

Pechbraun. Kopf, kräftig punktiert, drittes und viertes Glied der Maxillartaster hellbraun. Fühler, erstes und letztes Glied ungefähr gleich lang, zweites Glied am kleinsten. Halsschild mässig gewölbt, doppelt so breit wie lang, Seitenrand in der Mitte ausgebuchtet mit dem Vorderrand verrundet, mit dem Hinterrand eine scharfe Ecke bildend. Hinterrand gradlinig. Halsschild sowie Flügeldecken äusserst kräftig und sehr dicht grubenartig punktiert. Aus jedem der Punkte entspringt ein nach hinten gerichtetes Haar. Unterseite fein und weitläufig punktiert und fein behaart. Maxillartaster, Fühler und die etwas heller bräunlichen Beine ebenfalls behaart.

Länge, 4 Millimeter.

LUZON, Rizal, Montalban (*A. de los Reyes*).

Type in meiner Sammlung.

[1] Fauna Brit. India, Coleoptera (1912), 448.

PAUSINÆ

Genus **PSEUDOPAUSSUS** novum

Körperform länglich oval. Kopf dicht an das Halsschild anschliesend. Augen verhältnissmässig klein. Fühler der beiden Geschlechter verschieden geformt, viergliedrig, das letzte Glied keulen- oder eiförmig. Halsschild ungefähr ein Drittel breiter wie lang, mässig gewölbt. Seitenränder vor der Mitte in gleichmässigem Bogen ausgebuchtet, nach hinten zu verengt, am Hinterrand eine scharfe Ecke bildend. Flügeldecken gleichmässig gewölbt.

Type, *Pseudopaussus monstrosus* sp. nov.

Pseudopaussus monstrosus sp. nov. Tafel I, fig. 1 *a–d*, und fig. 2.

Rotbraun, Fühler und Beine etwas heller. Kopf dicht punktiert, nächst der Fühlerbasis etwas geschwollen. Lippentaster dreigliedrig, letztes Glied sehr gross und becherförmig. Maxillartaster viergliedrig, erstes Glied sehr klein, zweites und drittes Glied gleich lang, viertes Glied am längsten und am Ende zugespitzt. Halsschild und Flügeldecken dicht und regelmässig punktiert und fein behaart. Letztere mit einer feinen Furche nächst der Naht, die sich hinten mit derselben vereinigt. Naht und Hinterrand der Flügeldecke verrundet. Unterseite und Beine gleichmässig punktiert und fein behaart.

♂ : Erstes Fühlerglied an der Basis verengt, nach vorn kugelig aufgetrieben, zweites Fühlerglied sehr klein, drittes verschmolzen mit dem sehr grossen eiförmigen vierten Fühlerglied. Letzteres mit einer Rinne die über der Mitte in der Längsrichtung und vorn um das Glied herumläuft.

♀ : Erstes Glied grösser als das zweite und dritte, zweites am kleinsten. Viertes Glied sehr gross, keulenförmig, in der Mitte etwas gewölbt. Die Fühler beider Geschlechter sind äusserst fein punktiert und fein und dicht behaart, sowie mit vereinzelten längeren Börstchen besetzt.

Länge: ♂, 3.8 Millimeter; ♀ 3.5.

LUZON, Rizal, Montalban (*A. de los Reyes*).

Typen in meiner Sammlung.

Diese Art wurde von meinem Sammler in Anzahl unter Baumrinde und in Baumlöchern zusammen mit Ameisen gefunden, letztere wahrscheinlich zum Genus *Pheidole* gehörig. Herr McGregor fand auch diese Art auf der Insel Biliran; ebenso fing ich ein Exemplar in Manila am Licht.

CERAMBYCIDÆ

Proteuclea sulphureomaculata sp. nov. Tafel I, fig. 5.

Schwarz, rotbraun tomentiert. Kopf: Lippentaster rot, das letzte Glied schwarz. Fühler schwarz. Stirn zerstreut punktiert, mit deutlicher nicht tomentierter Mittelleiste die auf dem Scheitel in eine feine Furche ausläuft. Halsschild ein wenig breiter wie lang, mit kräftiger jedoch sparsamer Punktierung; Seiten mit einem warzenartigen Höcker nächst dem Vorderrande. Die Tomentierung wird durch die Punktierung unterbrochen. Flügeldecken kräftig zerstreut punktiert, die Tomentierung in der vorderen Hälfte schwach, nach den Hinterrändern zu kräftiger und durch kleine schwarze Flecken unterbrochen. In der Mitte jeder Flügeldecke am Seitenrande, nach vorn gerichtet, ein grosser länglich-ovaler schwefelgelber Fleck. Unterseite und Beine sehr kräftig tomentiert, nur spärlich durch kleine schwarze Flecken unterbrochen.

Länge, 18 Millimeter; Breite, 5.8.

LUZON, Benguet, Berg Santo Tomas, in einer Höhe von ungefähr 2,400 Meter (*W. Schultze*). Ein zweites Exemplar vom selben Fundort (*O. Schütze*).

Type in meiner Sammlung.

Diese Art ist relativ gedrungener gebaut als *P. laterivitta* Heller die mir aus Luzon, Laguna, Paete, gesammelt von R. C. McGregor, vorliegt.

SCARABÆIDÆ

CETONINÆ

Astraea benquetia sp. nov. Tafel I, fig. 7.

Sammtschwarz, Kopf glänzend und kräftig punktiert. Clypealvorderrand mässig ausgebuchtet, je seitlich am Vorderrand ein vorstehender rötlicher Haarbüschel. Der mittlere Teil des Clypeus wulstartig erhaben, eine dreieckige Form bildend, die in einen Kiel auf dem Scheitel ausläuft. Seitlich dieses Kieles ist die Punktierung besonders kräftig und behaart. Je ein kleiner länglicher weisslich-gelber Tomentfleck nächst den Augenvorderecken. Thorax: Seitenrand glänzend. Längs desselben ein schmaler Tomentstreifen nicht bis an die Hinterecken reichend. Auf dem Disk über dem Schildchen ein Längsfleck, seitlich davon am Hinterrande je ein runder Fleck und über diesen

je zwei weitere kleinere Flecke. Schildchen mit einem Längsfleck in der Spitze. Schultern behaart und mit einem grossen länglichen Fleck. Flügeldecken schwach weitläufig reihenförmig punktiert und mit wenigen Längsnadelrissen. Schulterecken kräftig vorstehend. Jede Flügeldecke mit elf Tomentflecken die wie folgt verteilt sind. Zwei kleine nächst den Schulterecken, ein grösserer strichförmiger am Seitenrand nächst der Flügelbasis, drei weitere im diskalen Teil, zwei davon vor der Mitte und einer auf dem letzten Viertel. Drei weitere Flecken am Aussenrand, von welchen der mittlere der grösste ist und zwei kleine nächst dem Hinterrand. Die Naht verläuft in eine mässig ausgeprägte Spitze. Das Pygidium ist sehr dicht nadelrissig fein behaart und in der Mitte, etwas nach unten zu, zu einem Buckel aufgetrieben. Je seitlich ein grosser dreieckiger Tomentfleck. Nur der Buckel schwarz. Unterseite und Beine glänzend schwarz und fein behaart. Mittelbrust kräftig kreisförmig nadelrissig, dicht behaart und mit einem dreieckigen Tomentfleck am Vorderrand. Hinterbrust ebenfalls nadelrissig. Abdominalsegmente nach den Seiten kräftig weitläufig punktiert, nach der Mitte zu schwächer. Hinterränder der Segmente, mit Ausnahme der zwei letzten, seitlich mit schmalen Tomentstreifen, die des ersten und zweiten Abdominalsegmentes laufen makelartig zusammen.

Länge, 16 Millimeter; Breite, 8.5.

LUZON, Benguet, Berg Santo Tomas, in 2,400 Meter Höhe (*Frau M. Schultze*).

Type in meiner Samlung.

Protaetia igorota sp. nov. Tafel I, fig. 6.

♂ : Metallisch grün glänzend. Clypealvorderrand schwach aufgebogen und seicht gekerbt. Kopf kräftig dicht und unregelmässig punktiert, nur der Scheitel ohne Punkte. Clypeus nächst den Augenwinkeln mit je seitlich einem kleinen länglichen Tomentfleck. Stirn sowie Ränder des Kopfes über den Augen gelblich-braun behaart. Fühler dunkelgrün. Thorax kräftig weitläufig punktiert, im diskalem Teil nächst dem Schildchen ohne Punkte. Längs des Seiten- und Vorderrandes ein schmaler gelblich-weisser Tomentstreifen, im diskalen Teil je seitlich, nach vorn gerichtet, ein keilförmiger und darüber je zwei kleine runde Tomentflecken. Schultern, Unterseite des Thorax, sowie Seiten der Abdominalsegmente kräftig behaart. Schildchen glatt. Flügeldecken fein, weitläufig und reihenförmig punktiert. Nächst den Schulterecken je zwei Tomentflecken, ein grösserer und darunter nahezu zusammenhängend mit letzterem

ein kleinerer. In der Mitte jeder Flügeldecke an der Naht ein grosser und im hinteren Viertel ein etwas kleinerer Tomentfleck, durch einen feinen irregulären Streifen längs der Naht mit einander verbunden. Längs der Seiten- und Hinterränder der Flügeldecken ein makelartig erweiterter Tomentrandstreifen, die Naht in eine schwache Spitze verlaufend. Das Pygidium ist fein und weitläufig quer nadelrissig skulptiert und fein behaart. Von der unregelmässig makelartigen Tomentierung bleibt nur ein Längsstreifen in der Mitte des Pygidiums frei. Schenkel und Schienen kräftig behaart. Mittelschenkel unterseits nächst dem Kniegelenk mit einem kleinen Tomentfleck. Abdominalsegmente dunkel kupfrig-metallisch glänzend mit je einem Randfleck und seitlich einem länglich ovalem Tomentfleck.

♀ : Flügeldecken dunkel kupfrig-metallisch glänzend, Beine sowie Abdomen schwarzbraun metallisch. Die Tomentflecken am Seitenrande der Segmente nur schwach angedeutet, die der Unterseite sowie der des Mittelschenkels fehlen.

♂ : Länge, 19 Millimeter; Breite, 11. ♀ : Länge, 24 Millimeter; Breite, 14.

LUZON, Benguet, Berg Santo Tomas (*M. und W. Schultze*).

Typen in meiner Sammlung.

Diese Art erinnert etwas an *P. philippinensis* Fabr., ist jedoch grösser als diese und viel gedrungener gebaut.

Meine Frau und ich fingen von dieser Art 23 Exemplare im März, 1916, am Abhange des Berges Santo Tomas in ungefähr 2,000 Meter Höhe.

Unter dieser Anzahl befanden sich nur zwei Weibchen.

TROGINÆ

Trox manilensis sp. nov. Tafel I, fig. 4 und 4 *a*.

Schwarz, aschgrau tomentiert. Kopf mit zwei warzenartigen Buckeln auf der Stirn, der Rand fein beborstet. Thorax, längs der Mitte, mit einer seichten Rinne und kräftigen Längswülsten, am Hinterrand über dem Schildchen grubenartig eingedrückt, kräftig und weitläufig punktiert, Seitenrand fein beborstet, an den Hinterecken eingebuchtet. Jede Flügeldecke mit Andeutung von einem Buckel in der Mitte im letzten Viertel, desgleichen mit einer längs der Naht sowie vier weiteren kräftigen mit Tuberkeln besetzten Längsleisten, zwischen den letzteren je eine sekundäre Tuberkellängsleiste. Zwischen den primären und sekundären Längsleisten befinden sich reihenweise kräftige Punkte. Die Tomentierung ist durch schwarze Flecken unterbrochen,

welche wiederum in Längs- und Querreihen gruppiert sind. Unterseite und Beine, mit Ausnahme der Innenseiten der letzteren, ebenfalls tomentiert. Vorderer Teil der Vordertibia schaufelartig erweitert, etwas nach unten gebogen, der Aussenrand in der Mitte mit einem kräftigen Zahn. Innenrand sowie Seitenränder der Mittel- und Hintertibien ebenfalls fein beborstet.

Länge, 12.5 Millimeter.

LUZON, Manila (*Frau M. Schultze*).

Type in meiner Sammlung.

Diese Art wurde in 3 Exemplaren an Aas gekötert.

BEMERKUNGEN ÜBER CYCLOMATUS ZUBERI WATERHOUSE (LUCANIDÆ). TAFEL II, FIG. 1–9

Vor einiger Zeit beschrieb Prof. Heller[2] eine Lucanidae, *Cyclomatus fuller-bakeri*, vom Berg Banahao, Provinz Laguna, Insel Luzon. Jedoch its diese Art als solche nicht haltbar, sondern nur eine Form von *C. zuberi* Waterhouse, die Heller auch zum Vergleich herangezogen hat, und muss als Synonym zur letzteren Art gestellt werden. *Cyclomatus fuller-bakeri* ist die mesodonte Form von *C. zuberi* Waterh. An dem reichhaltigen Material dieser Art in meiner Sammlung ist es möglich die Formen von *C. zuberi* genau zu erkennen. Auf Tafel II habe ich versucht die Formenextreme dieser Art darzustellen. Unter den Männchen, Tafel II, Fig. 1–9, sind folgende Merkmale in den verschiedenen Entwickelungsstadien besonders zu erwähnen. Fig. 1, das kleinste unter meinem Material vorhandene Männchen, hat die Mandibel nahezu regelmässig gesägt. In Fig. 2 fangen die Zähne an sich abzugruppieren, d. h. die 2 nächst der Mandibel Basis, sowie 2 im letzten Drittel, sind näher aneinander gerückt und stärker entwickelt. Fig. 3 stellt eine Entwickelungsphase dar mit einem Doppelzahn nächst der Basis und einer Gruppe von Zähnchen im letzten Viertel der Mandibel, von welcher der hinterste kräftig entwickelt ist. Fig. 4, 5 and 6 ähneln in der Mandibelbildung Fig. 3, nur zeigt sich, dass je stärker die Induvidien entwickelt sind, der Doppelzahn der Basis relativ zur Entwickelung des Exemplares sich mehr oder weniger von dem Clypeus entfernt. Desgleichen ist der letzte Zahn der Gruppe im apikalen Viertel mehr oder weniger stark entwickelt. Teilweise bilden sich in der Mitte der Mandibeln, in den zuletzt

[2] Entom. Mitteil. (1915), 4, 291.

angeführten Entwickelungsphasen, ein oder mehrere kleine Zähne (Fig. 5, 6, 7). In der Form Fig. 7 zeigt sich deutlich das schon weit vorgeschrittene Vorrücken des Basaldoppelzahnes; und charakterisiert sich diese Form, sowie die folgenden, besonders dadurch, dass der letzte Zahn im apikalen Viertel sich schaufelförmig erweitert. In noch kräftiger entwickelten Exemplaren (Fig. 8) zeigt sich eine Umbildung des basalen Doppelzahnes zu einer einfachen spitzen Form, dabei ist zu bemerken, dass dieser letztgenannte Zahn mehr und mehr von der Basis ab nach vorn bis an, oder über, die Mitte zu vorrückt. Fig. 8½ stellt eine interesssante Monstrosität dar, in der an der rechten Mandibel der Basalzahn wie in der vorhergehenden Form gebildet, während an der linken Mandibel der Zahn schon etwas über die Mitte vorgeschoben ist. Dieses Exemplar ist in sofern interessant, als an der Mandibelbildung der Übergang zur mesodonten Form (Fig. 9, *fuller-bakeri*) leicht zu erkennen ist. Je nach der Entwickelung der Exemplare ist der Eindruck der Stirn und der des Scheitels des Kopfes kaum wahrnehmbar, Fig. 1; oder kräftig entwickelt, Fig. 7; oder als Extrem grubenartig vertieft, Fig. 9. Der Clypeus, welcher in kleinen Exemplaren sehr schwach entwickelt und abgeflacht ist, verlängert sich in grösseren Exemplaren. Sein Vorderrand biegt sich weniger oder sehr stark nach oben (Fig. 8–9). Die Weibchen von *C. zuberi* zeigen im Verhältnis zu den Männchen dieser Art sehr geringe Grössenunterschiede—Fig. 10, das kleinste Exemplar (18 mm.) meines Materials, und Fig. 12, das Grösste desselben (23 mm.). Zu bemerken ist, dass in beiden Geschlechtern, je nach dem Lebensalter der Exemplare, die Färbung variiert. Unter den Männchen gibt es kastanienbraune sowie graurotbraune Stücke mit bronzeartigem Schimmer. Die Mandibeln sind teilweise kupferbronzegrün, teilweise schwarz gerändert und intensiv rotbraun. Unter den Weibchen kommen Stücke vor mit schwarzbraunem Kopf und Halsschild.

Das Material welches ich zu diesen Beobachtungen heranzog wurde teilweise von Herrn R. C. McGregor und von meinem Sammler in Paete, Provinz Laguna, Luzon, in 49 Exemplaren beider Geschlechter gesammelt. Unter diesem Material befinden sich 9 Weibchen. Die folgende Tabelle, nach den Figuren der Tafel und den vorhandenen Exemplaren geordnet, ergibt folgende Formenproportionen:

TABELLE I.—*Anzahl und Grösse der verschiedenen Exemplare von Cyclomatus zuberi Waterhouse die in Tafel II angegeben sind.*

Fig.	Formen.	Exemplare.	Länge.[a]
			mm.
1	Priodonte	1	25
2	do	2	28
3	Amphiodonte	5	32
4	do	10	37
5	do	7	39
6	do	7	44
7	do	1	48
8	do	2	50
8½	(?)	1	50
9	Mesodonte	4	56
Total		40	

[a] Die Grössen beziehen sich nur auf die auf der Tafel abgebildeten Exemplare.

Daraus wäre zu schliessen, dass Fig. 4–6 die häufigsten Männchen Formen dieser Art darstellen.

Am gleichen Fundort wurden ebenfalls von Herrn McGregor die folgenden Lucaniden-Arten in Anzahl gesammelt: *Odontolabis alces* Fabr., *O. camelus* Oliv., *O. latipennis* Hope, *Metopodontus occipitalis* Hope, *Aegus acuminatus* Fabr., *Nigidius laevicollis* Westw., und *Figulus manilarum* Hope.

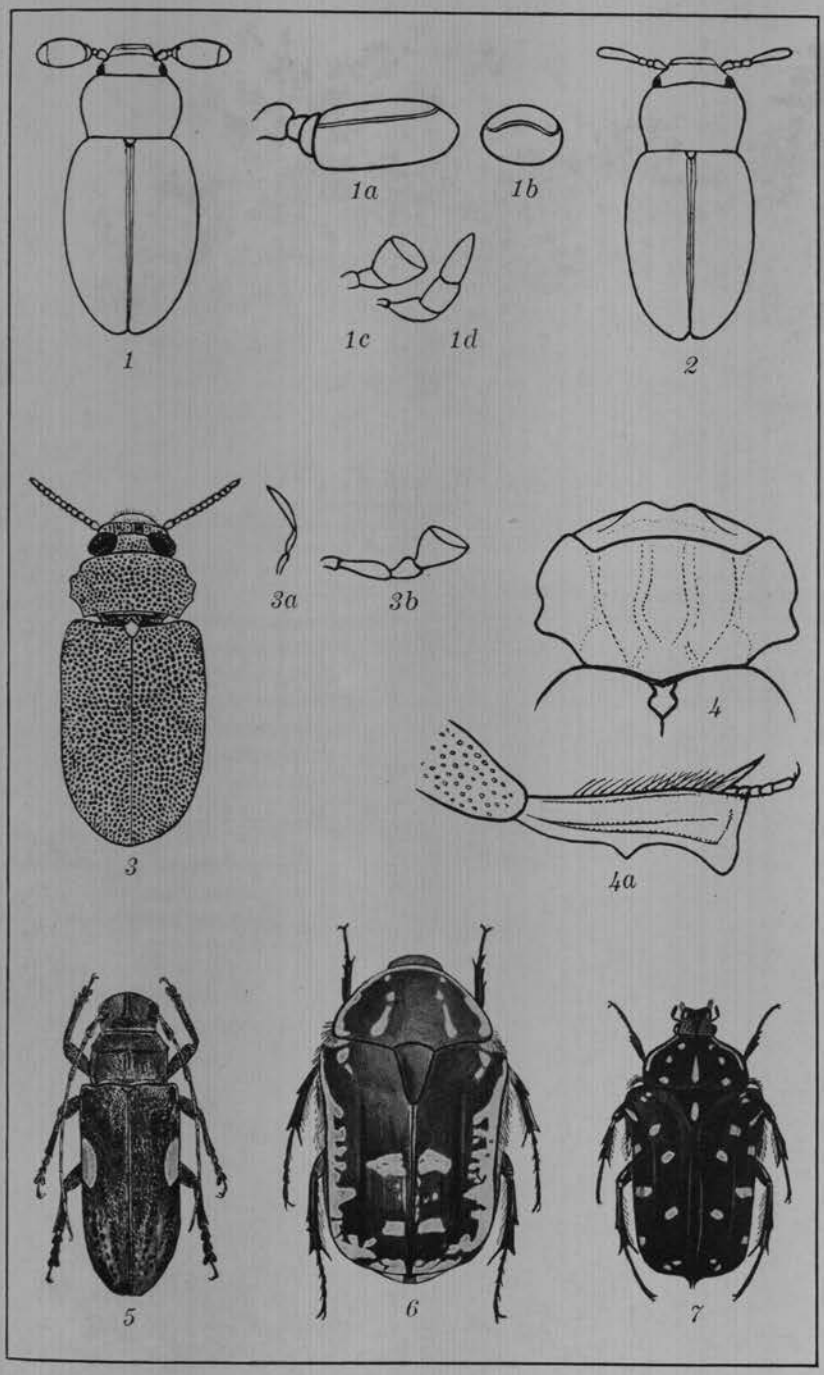
TAFELERKLÄRUNG

TAFEL I. NEUE PHILIPPINISCHE COLEOPTEREN

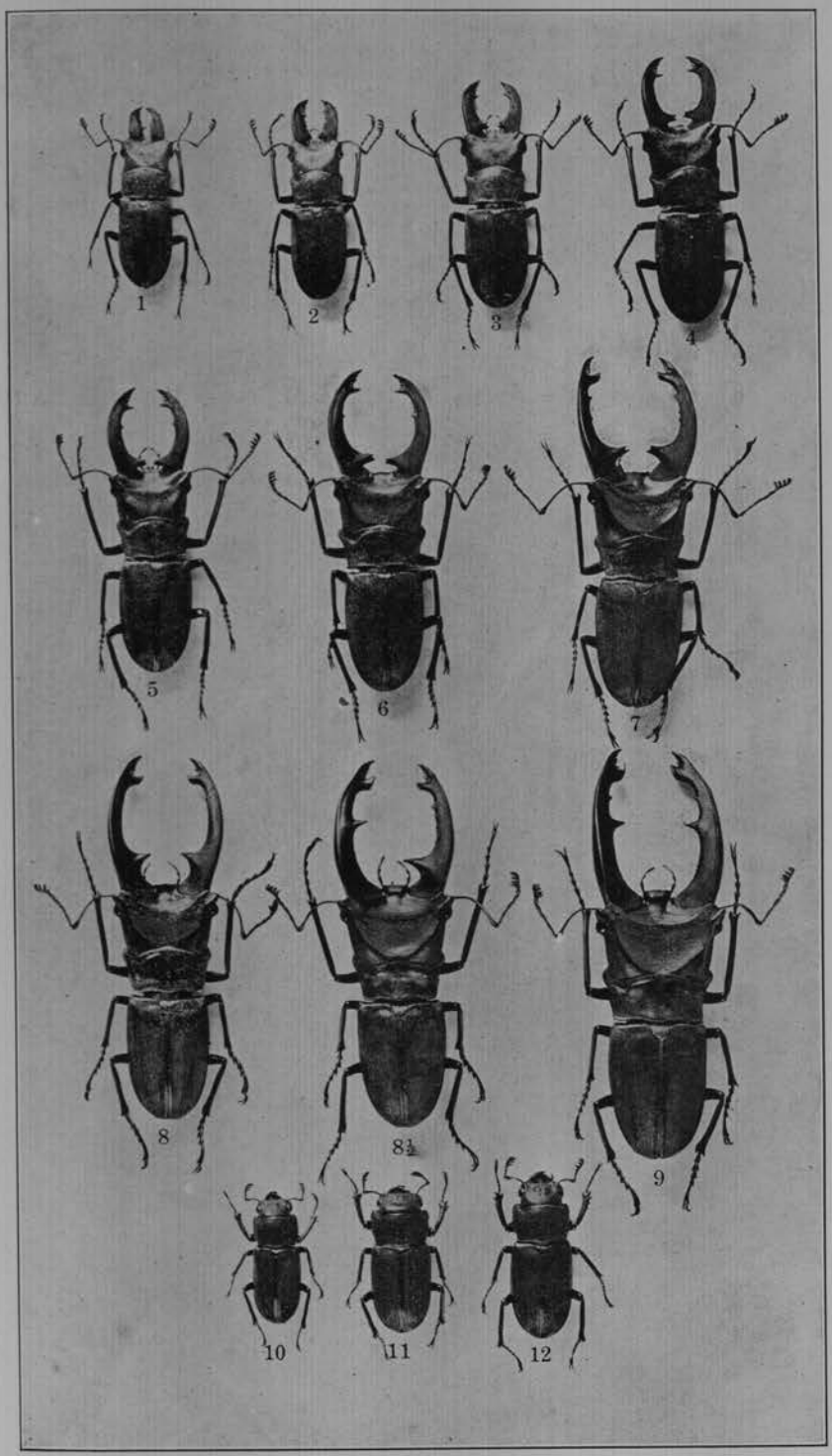
FIG. 1. *Pseudopaussus monstrosus* (? ♂) sp. nov.; 1*a*, Fühler; 1*b*, Fühler von der Spitze gesehen; 1*c*, Lippentaster; 1*d*, Maxillartaster.
2. *Pseudopaussus monstrosus* (? ♀) sp. nov.
3. *Monopaussus piceus* sp. nov.; 3*a*, Lippentaster; 3*b*, Maxillartaster.
4. *Trox manilensis* sp. nov.; 4*a*, linkes Vorderbein von unten.
5. *Proteuclea sulphureomaculata* sp. nov.
6. *Protaetia igorota* sp. nov.
7. *Astraea benguetia* sp. nov.

TAFEL II. FORMEN VON CYCLOMATUS ZUBERI WATERHOUSE

FIG. 1–2. Priodonte Form.
3–8. Amphidonte Form.
8½. Monstrosität.
9. Mesodonte Form.



TAFEL I. NEUE PHILIPPINISCHE COLEOPTEREN.



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